DOCUMENT RESUME

ED 309 936 SE 050 770

AUTHOR Gross, Michael P., Ed.; And Others
TITLE Working Together to Educate about the Environment. Selected Papers from the Joint Conference of the North American Association for Environmental Education and the Conservation Education Association (Estes Park, Colorado, August 18-23, 1989).
INSTITUTION Conservation Education Association, Madison, Wis.; North American Association for Environmental Education, Troy, OH.
PUB DATE Aug 89
NOTE 381p.
AVAILABLE FROM North American Association for Environmental Education, P.O. Box 400, Troy, OH 45373 ($12.00).
PUB TYPE Collected Works - Conference Proceedings (021)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Communications; *Curriculum Development; *Educational Technology; Elementary Secondary Education; *Environmental Education; Higher Education; International Cooperation; Natural Resources; Networks; *Professional Associations; Science and Society; Science Education; *Teacher Education
IDENTIFIERS *Environmental Education Research

ABSTRACT

Proceedings of a conference on environmental education are presented in this document. Featured at the conference were four general sessions, a number of additional invited presentations, three symposia, four workshops, and over 170 contributed presentations. The purpose of this volume is to provide a record of the papers presented at the conference. Presented papers focused on eight different conference strands. The papers in this proceedings are organized by strand and included alphabetically by author within each strand. The eight strands are: (1) "From Research to Application in Environmental Education"; (2) "Interdisciplinary and Interagency Cooperative Ventures"; (3) "Educating About Environmental Issues and Policies"; (4) "International Cooperative Ventures"; (5) "Curriculum and Teaching Strategies"; (6) "Communication Mechanisms: Networks, Consortiums, Newsletters"; (7) "Developing a Support Base for EE Programs: Marketing, Fund Raising, Volunteer Use"; and (8) "Materials and Programs for Educating About the Environment." Abstracts only are provided in cases where full-length papers were not received. (CW)

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Working Together To Educate About the Environment

1989 Joint Conference

Estes Park, Colorado

SE 050 770

Working Together To Educate About the Environment

1989 Joint Conference Proceedings

Selected Papers from the
Joint Conference of the
North American Association for
Environmental Education
and the
Conservation Education Association

Edited by
Michael P. Gross
Richard J. Wilke
Joseph F. Passineau
University of Wisconsin-Stevens Point

Published by
The NAEE/CEA
Joint Conference Committee
P.O. Box 400
Troy, Ohio 45373

August 1989

Preface

This is the proceedings volume of the Joint Conference between the Conservation Education Association (CEA) and the North American Associatio for Environmental Education (NAEE). The conference was held at the Estes Park Center, Estes Park, Colorado from August 18-23, 1989. Featured were four general sessions, a number of additional invited presentations, three symposia, four workshops, and over 170 contributed presentations. A number of field trips were offered before, during, and after the conference. Though the conference was not officially designated as an international one, participants from ten nations took active roles in various sessions.

A number of organizations in addition to NAEE and CEA participated both formally and informally in the conference. Among them were the American Nature Study Society, American Institute of Architects, The Discovery Channel, Edison Electric Institute, Alliance for Environmental Education, Colorado Division of Wildlife, Colorado Education Department, Colorado Education Association, numerous federal agencies, and others.

The purpose of this volume is to provide a record of the papers presented at the conference. Presented papers focused on eight different conference strands. The papers in this proceedings are organized by strand and included alphabetically by author within each strand. Abstracts only are provided in cases where full-length papers (1,500 words or less) were not received in time to meet the publication deadline.

The editors most gratefully thank all of the conference presentors, particularly those who submitted full-length papers for the proceedings. Also deserving commendation is Char Pingel for her efforts in typesetting and preparing the edited manuscript. Most importantly, the editors wish to express their appreciation to the Boards of Directors and membership of the Conservation Education Association and the North American Association for Environmental Education. Without their confidence and the leadership of people such as Paul Brandewein, this joint conference would not have occurred. The conference theme - "Working Together to Educate About the Environment," was very appropriate. It took scores of people working together to plan and offer this conference. As a result, new bonds have been established which will facilitate continued cooperation in working together to educate about the environment.

Richard Wilke, Conference Chair
Michael Gross, Program Chair
Joseph Passinear, Special Events Chair
Editors, Conference Proceedings

Working Together to Educate About the Environment

1989 Conference Proceedings

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General Session Presentations

The following general session presentations were made during the conference. The text of the presentations were not available at the time of publication of this proceedings. The presentation titles and a brief biography of each speaker is provided below.

General Session 1: A Promise to Earth
August 19, 7:00 p.m., Cheryl Charles and Bob Samples.

Dr. Cheryl Charles is national director of the award winning K-12 conservation education program, Project WILD. Bob Samples is an independent scholar and author. Both Cheryl and Bob are members of the Board of Directors of the Winstar Foundation, established by John Denver and Tom Crum; and are co-editors and designers of the Windstar Journal.

General Session 2: Working Together to Educate About the Environment: The Discovery Channel's Work with Environmental Organizations
August 20, 7:00 p.m. John S. Hendricks.

John S. Hendricks created America' first cable network designed to provide world class documentary programming in the areas of nature, science and technology, history, human adventure, and world exploration. The Discovery Channel is involved in several environmental education initiatives. It works cooperatively with several major environmental organizations, including the National Wildlife Federation and the World Wildlife Fund.

General Session 3: Earth Day 1990: Education for the Environmental Decade
August 22, 7:00 p.m., Denis Hayes.

Denis Hayes is Chairman of Earth Day 1990. In 1970, Hayes was executive director of the first Earth Day, which with an estimated 25 million participants, was the largest political demonstration in history. An attorney, Hayes is on leave from his San Francisco law firm to direct the events associated with the twentieth anniversary of the first Earth Day.

General Session 4: Humans and the Habitat:
A Twenty-First Century Vision of Cooperation
August 23, 10:45 a.m., Milt McLaren and Bill Hammond.

Dr. Milt McLaren is a member of the faculties of Biology and Education at Simon Fraser University. His is a member of the National Project WILD Steering Committee, Man and the Biosphere Canada Committee, and President of Sun Flower Designs. Bill Hammond is an educator and author and serves as director of environmental education and instructional development services for the Lee County Schools, Florida, is a member of the National Project WILD Steering Committee, and was President of the Human Habitat Project, Inc. He is President of the Natural Contexts Designs educational consulting firm.

Sectional Workshops

The following workshops were offered during the conference.

Workshop 1. Acting on Action: Preparing Children as Creators of the 21st Century

This workshop focused on the action component of environmental education. While there is general agreement that the goal of environmental education is to create an environmentally responsible citizenry, what are we as professional educators actually doing to accomplish the goal? This workshop examined assumptions; reviewed various instructional models presently being used to support teachers and students in moving from awareness to action; and provided experiences with some of the skills necessary to successfully accomplish action projects involving K-12 youth.

The coordinator for this workshop was Bill Hammond (ph. 813-275-3003). Participant contributors were: Terry Wilson, Kathy McGlauflin, Peggy Cowan, Ron Gardella, June McSwain, Jack Green, Dave Engleson, and Cheryl Charles.

Workshop 2. Volunteer Expo

This workshop was designed to immerse participants in the abundant wealth of current reference information, support systems, and practical, useful techniques. Included were workshop field trips in the Denver area. The field trips were followed the next day by panel discussions and interactive sessions with leading experts in the field of volunteerism. Topics addressed included: marketing, motivation, planning and evaluation, training, decision-making, coping with change, volunteer programs and communities they serve, legal issues, fund raising, future trends and new technology, networking and support systems.

The coordinator for this workshop was Barbara Gugliotti (ph. 813-343-0777).

Workshop 3. Our Common Future: Sustainable Development in the 1990's

The workshop consisted of two parts. In part one participants explored the ecology and patterns of sustainable development in the Rocky Mountain National Park area. During the second portion of the workshop participants explored global sustainable development. The focal point for discussions was the 1987 publication of the World Commission on the Environment and

Development, Our Common Future. Action oriented work groups met to address some of the major issues the report presents.

The coordinators for the workshop were Jerry Berberet (ph. 503-370-3152) and Adelia Peters (ph. 419-352-6396).

Workshop 4. Commission on Environmental Education Research Workshop

The North American Commission on Environmental Education Research has sponsored three projects: curriculum evaluation/review, software review, and the abstracting of research. This special workshop was designed to train individuals interested in participating in the next phase of abstracting research in environmental education.

Coordinator for this workshop was Tom Marcinkowski (ph. 314-781-7341).

Symposia

Symposium 1. Preparing Classroom Teachers to Be Environmental Educators: How Might It Be Done?

This symposium responds to recommendations to explore teacher preparation made during the Environmental Education in School Curricula Symposium conducted as part of the 1987 NAEE Annual Conference. There are three presentations on preservice approaches and five on inservice approaches. They represent a variety of viewpoints and reflect the needs of teachers in programs such as those described in Trends and Issues in Environmental Education: EE in School Curricula, the report of the 1987 symposium.

Symposium planners and moderators are Dr. Randy Champeau, University of Wisconsin-Stevens Point; Dr. John Disinger, The Ohio State University; Dr. E. Paul Hart, University of Regina; and David Engleson, Wisconsin Department of Public Instruction.

Preservice Education

Preparing Teachers as Environmental Educators - How?

Assume that conceptual development and information acquisition, coupled with environmental action skills, will lead to more effective environment-oriented behavior. If so, a logical conclusion is that teachers need those elements plus teacher education basics. But EE curriculum development appears to have followed models not proven successful in changing school practice. We need to rethink some of the change processes that appear to impede rather than promote the conditions envisaged by much of the environmental education literature. This paper discusses those processes that must be altered if we seriously wish to change the education system.

— Paul Hart, Faculty of Education, University of Regina, Regina, Saskatchewan, Canada S4S 0A2

Using Cooperative Learning Strategies to Develop Conflict Resolution Skills

Most environmental problems and issues arise as a result of a conflict of interests, usually between the ideals of environmental preservation and the realities of economic development. To resolve many of these issues, people need to know how to get along with each other in cases where values and attitudes are in conflict. One possible step in the right direction is to incorporate the use of cooperative learning in classroom simulations of controversial topics. Specific skills such as sharing views, being critical of ideas and not people, role reversal, etc., can be learned directly by students, and with practice, will become part of a much more "cooperative" attitude in dealing with the resolution of issues.

— James Lubbers, Department of Science Education, East Carolina University, Greenville, North Carolina 27858

Preservice Teacher Perspectives on Environmental Education

This presentation reviews the results of a survey questioning the perspectives of preservice teachers on their experience with mandated environmental education coursework. The survey was administered to 105 junior and senior K-12 education majors who had recently completed EE coursework at the University of Wisconsin-Stevens Point. Results indicate students perceive a need for mandating preservice training in EE. They perceive their EE coursework as being instrumental in motivating them to include environmental concerns in their teaching. They believe environmental science content should be taught simultaneously with appropriate K-12 methods in preserve training. Further, they believe EE should be a priority in the K-12 school system and would be best accomplished through the process of infusion.

— Randall Champeau, Michael Gross, and Richard Wilke, College of Natural Resources, University of Wisconsin, Stevens Point, WI 54481

Inservice Education

Student Dropout Prevention: Teacher Inservice Connections to Environmental Education

Inservice programs for teachers, grades 4-12, focus on aspects of eduction which serve the needs of potential dropouts: personally relevant content, variety of learning styles, cooperative learning, and interdisciplinary themes. Four well-known programs are used. Classroom implementation techniques include linking environmental concepts to drug abuse and personal planning; utilizing environmental topics via interdisciplinary activities for middle schools; and applying environmental awareness and involvement activities to build self-esteem in high school students.

— Darleen K. Stoner, California State University, San Bernardino, California 92407

Environmental Education at a Distance

This presentation outlined an inservice course for EE teachers studying at a distance from the host institution, stating the course's assumptions about the nature of environmental education, about the relationship of schooling and EE, and about professional development.

It also discussed some of the practical issues: appropriate support materials; other required forms of support such as telephone tutorials, regional tutorials, self-help groups; the advantages and disadvantages of committing the course to print fo distribution to distant students; and the costs of materials production and support services.

— Ian Robottom, School of Education, Deakin University, Victoria 3217, Australia

Inservice Education in Alaska

A corsortium model for staff development includes district membership fees and a requirement for in-district plans for implementation of instructional or curriculum change. The model also empowers teachers as decision-makers in the process and not just recipients of the training. Meshing environmental education with other educational reforms that the district is committed to, such as cooperative learning, clinical teaching, whole language or process science enhances the likelihood of long-term change.

— Peggy Cowan, Alaska Department of Education, P.O. Box F, Juneau, Alaska 99811-0500

Cooperative Model for Inservice Environmental Education in the State of Kansas

Teachers, preservice college students and educators from non-formal settings attend an annual environmental education inservice workshop that explores the total school curriculum. The two-day workshop is scheduled immediately prior to the Kansas Association of Teachers of Science (KATS) meeting. Strategies for conceiving, organizing, publicizing, presenting, and evaluating were presented. Suggestions for other states were discussed.

— Emmett L. Wright, Professor of Environmental Education and Head, Division of Teacher Education, Kansas State University, Bluemont Hall, Manhattan, Kansas 66506

Environmental Education: The In-Service Experience

Teachers will teach only what they are comfortable with. It is, therefore, not surprising that most teachers do not utilize environmental education techniques and strategies with their classes, nor do they take the time to address environmental problems and issues. The realistic constraints of a classroom situation and information from recent research papers and teacher observations, and a series of in-service workshop steps that have proved to be very effective with educators in Connecticut were addressed.

— Juan A. Sanchez, Center for Environmental Education, Manchester Public School System, Manchester, Connecticut

Symposium 2. Working Together at the Local and National Levels for Successful Fundraising and Program Delivery

The symposium planner and moderator is Karen S. Hollweg, Project Director for the dissemination of Denver Audubon Society's Urban Education Project and works out of the Denver Audubon Society Office, 3000 South Clayton, Room 206, Denver, Colorado 80210.

Panelists in this symposium are Helga Burre, Theressa Mattei, Bob Sullivan, Martha McAfee, JoAnn Riecke, Karen Mauck, Patty Pendleton, and Peggy Lehman.

Abstract

For the last 1-1/2 years, groups in eight cities across the country have been working together to implement projects that provide thousands of urban children with unique learning experiences. This paper describes their collective efforts: how they got started, what they are doing, the support they are receiving from the National Science Foundation, and some benefits of their synergistic relationships.

In early 1988, eight cities submitted a joint proposal to the National Science Foundation (NSF), Division of Materials Development, Research and Informal Science Education and received funding for the three year project they proposed. The proposal won high marks from the NSF review panel, with one panelist dubbing it "one of the best examples of collaborative planning across state lines that I've ever seen...a model for informal science education."

This paper describes how the eight cities started working together, the nature of their collaboration, and what the NSF grant entails. (At the symposium on August 20, 1989, project coordinators from these cities discussed the pros and cons of their collective efforts and made suggestions regarding coalitions based on their experiences. It was not possible to include the text of the discussion in this publication.)

How We Got Started

In 1984, the Denver Audubon Society began the development of its Urban Education Project, a volunteer-based natural science initiative. The purpose of the project is to provide Denver's children with enjoyable neighborhood experiences that will heighten their awareness, expand their knowledge, and develop their respect for the plants and animals living in their immediate surroundings. The primary objectives are to enable children to:

— explore their local environment, the plants and animals that live there, and the ecological interactions of those plants and animals.

— interact with adults who demonstrate interest in and share enthusiasm for investigating nature out-of-doors.

— develop the skills necessary to observe, use scientific tools, record, compare, quantify and analyze data, and apply critical thinking to reach conclusions.

The program emphasizes hands-on experiences, not facts and information. (For a more detailed program description, see Hollweg 1986 and 1988).

Articles and conference presentations about the project brought scores of inquiries from 27 states. By late 1987 there were enough cities interested in the project and enough need for this approach to science education that the Denver Audubon Education Director, with the support of the Denver Audubon Board, began discussing possible dissemination strategies with NSF. We sent a form letter to and solicited responses from everyone who had inquired about the project, and we found 15 or so cities very interested in starting local projects to achieve the same objectives.

In early 1988, seven cities which seemed to have the potential for strong coalitions and which were geographically dispersed, were selected to host one-day workshops, funded by NSF. At each workshop, a group of professionals and volunteers representing potential project cosponsors and user groups learned about the Denver project form the Urban Education Project Director, analyzed the need and niche(s) for such a project in their community, and drafted a plan for starting up such a project.

The Joint Grant Proposal

The decisions made at these workshops served as the basis for the joint NSF proposal entitled "Dissemination of Denver Audubon Society's Urban Education Project." (See Directorate for Science and Engineering Education 1987 for grant proposal guidelines.) We want not to create new materials, but do create a support system that would facilitate the delivery of a proven program in cities across the nation. We expected that the coalition of sponsors in each city would tailor the program to best serve their targeted audience and to best utilize existing and available community resources. We wanted to encourage diverse approaches and local ownership in the achievement of a common set of objectives. And through the collaboration and communication among project leaders in various cities, we hoped to create a national network of like-minded colleagues that would continue to support these kinds of education efforts after the grant ended.

To achieve these goals each city selected a lead agency (see Table 1) and made a commitment to:

— initiate a project of the size and on the schedule described in their timeline,

— identify a coordinator responsible for moving the project forward,

— fund all on-going project costs locally, and

— sustain the project once it has been established.

In turn, NSF agreed to support the local projects by:

— providing advice and consultation to each city (the staff member who had established Denver's project would work full-time as Project Director of the Dissemination Grant, traveling to each city 2-3 times per year and communicating with them on an ongoing basis). The Project Director would help cities learn from Denver's experiences and avoid "reinventing the wheel," and would serve as an outside change agent and consultant to assist the cities in sticking with the project until it was off and running.

— paying for one-time costs to acquire start-up materials for each city's project.

— sponsoring annual meeting/work sessions at which representatives from the eight cities could exchange ideas, discuss concerns/problems, and plan for the coming year.

— establishing an electronic mail network to facilitate communication among cities.

— encouraging conference presentations and professional publications to make additional cities aware of this approach to hands-on science education.

— evaluating the degree to which each city succeeds in implementing an urban education project, the value of the dissemination strategies used, and the outcomes achieved by participants in each city.

Table 1. Participating Cities

Project Title and Lead Institution: Boston Environmental Education Experiences, Mass. Audubon: Boston, 3 Joy Street #50, Boston, MA 02108

Members of Local Coalition: Dorchester Park Assn., Franklin Park coalition, Boston Natural Areas Fund, Greenspace Alliance, Boston Parks & Rec. Dept.

Staff/Funded By: 1 FTE, local grants

Program Emphasis (#volunteers/kids involved annually): Hands-on science investigations in neighborhoods, parks and open spaces through schools and community daycare centers of the central city. (200/2,000)

Project Title and Lead Institution: Louisville Urban Ecology Project, Museum of History & Science, 727 West Main, Louisville, KY 40202

Members of Local Coalition: Jefferson County Public Schools, Louisville Audubon Society, Kentucky Assn. for Environmental Education, Louisville Zoo, Louisville Sierra club, Operation Brightside

Staff/Funded By: 30 hr/wk, coordinator, participant fees and contributions

Program Emphasis (#volunteers/kids involved annually): Hands-on outdoor science, especially for inner-city, "high stress" predominantly black chldren through schools and community youth agencies. Involve citizens in supporting elementary science education. (80+/2,600)

Project Title and Lead Institution: Prescott Volunteers Teaching Children, Prescott Audubon Society, 3095 Jenny Drive, Prescott, AZ 86301

Members of Local Coalition: Prescott College, Prescott Unified School District, School PTA's

Staff/Funded By: 20 hr/wk, coordinator, volunteers

Program Emphasis (#volunteers/kids involved annually): Hands-on neighborhood science experiences for fourth graders in city and rural schools to enhance their science curriculum. (66/360)

Project Title and Lead Institution: Outdoor Investigations Project, Arlington Ind. School District, 1203 West Pioneer Parkway, Arlington, TX 76013-6246

Members of Local Coalition: School PTA's, Arlington Boys Club

Staff/Funded By: part time of existing staff paid by school district and by boys club

Program Emphasis (#volunteers/kids involved annually): Enhance science instruction for upper elementary students using volunteer-produced materials and volunteer-led outdoor investigations. Summer and after school programs through Boys Club. (100/1,000)

Project Title and Lead Institution: Urban Education Project, Seattle Audubon Society, 619 Joshua Green Building, Seattle, WA 98101

Members of Local Coalition:

Staff/Funded By: seeking funds for 20-30 hr/wk coordinator

Program Emphasis (#volunteers/kids involved annually): Provide urban minority kids with enrichment activities at school and at community centers after school. (75+/600+)

Project Title and Lead Institution: Broward Outdoor Natural Urban Studies, Broward City Audubon Society, 1001 N.W. 62nd St. #203, Fort Lauderdale, FL 33309

Members of Local Coalition: Broward County Schools

Staff/Funded By: seeking school district salary for 20 hr/wk coordinator

Program Emphasis (#volunteers/kids involved annually): Hands-on neighborhood science investigations for inner-city children. Priority audience is children from low socio-economic, Performance Improvement Program Schools. (70/600)

Project Title and Lead Institution: Sidewalk Safari Project, Ruffner Mountain Nature Center, 1214 South 81st Street, Birmingham, AL 35206

Members of Local Coalition: Educators from: The Discover Place, Red Mountain Museum, Soil Conservation Service

Staff/Funded By: seeking funds for part-time coordinator

Program Emphasis (#volunteers/kids involved annually): Outdoor hands-on science explorations for disadvantaged, primarily black youngsters through after school and summer activities at 8 birmingham housing projects. (20/200)

Benefits of Collaboration

The cities listed in Table 1 are now beginning the second year of this three-year grant. Volunteer-based education projects have been started in seven cities. These cities have benefited from Denver's experience, from the economies that come with pooled, volume purchases of materials and supplies, and from the ideas they have exchanged with each other. It is anticipated that the interactions among the leaders in these cities will increase as the grant continues and that they will find these interactions stimulating and helpful.

At a local level, by working with a coalition of institutions and organizations within their city, project sponsors have benefited by learning from each other, dividing up the numerous tasks and responsibilities, sharing resources, and applying their collective wisdom to the task of funding their project.

Conclusion

The project evaluation conducted in 1990-91 will assess the value of this cooperative approach to program dissemination and implementation. Early indications are that the joint ventures described here are enabling many organizations and institutions to achieve objectives more easily than they might have on their own and is providing stimulation and opportunities for personal growth to the professionals and volunteers involved.

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Note: This material is based upon work supported by the National Science Foundation under Grant No. MDR-8850604. The Government has certain rights in this material. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

Symposium 3. Institutional Commitments to Environmental Education

In this symposium, representatives of organizations and agencies describe their institution's past, present, and future commitments to environmental education. The day-long symposium features two keynote presentations, one on the efforts of the Alliance for Environmental Education and another on the Environmental Protection Agency.

In addition, panel sessions focus on the challenges and successes of institutions with similar audiences or mission areas including commitments of environmental organizations, youth organizations, forestry-related organizations and agencies, and international program organizations. Each panel session is comprised of a presentation by representatives of their organization followed by an open discussion and question and answer period.

Featured Presentations

The Alliance for Environmental Education
Steven Kussmann, President
The Alliance for Environmental Education
Box 1040, 3421 M St., N.W.
Washington, DC 20007

Environmental Protection Agency
Cece Forget
United States Environmental Protection Agency (8WM-EA)
999 18th Street
1 Denver Place, Suite 1300
Denver, CO 80202-2413
(303) 293-1542

Environmental Organizations

National Wildlife Federation
Judy Braus
Education and Curriculum Development Specialist
National Wildlife Federation
1400 Sixteenth Street, NW
Washington, DC 20036-2266
(202) 797-6800

National Audubon Society
David Stokes
Education Program Specialist
Schlitz Audubon Center
111 E. Brown Deer Road
Milwaukee, WI 53217
(414) 352-2880

The Wilderness Society
Mary F. Hanley
Vice President - Public Affairs
1400 Eye Street, NW
Washington, DC 20005
(202) 842-3400

Youth Organizations

Girl Scouts of America
Donna L. Nye
Senior Program Specialist
830 Third Avenue
New York, NY 10022
(212) 940-7416

4-H, Extension Service, U.S. Department of Agriculture
Allan T. Smith, Ph.D.
National 4-H Program Leader
Science, Technology, and Natural Resources
3860 S. Bldg., U.S.D.A.
Washington, DC 20250-0900
(202) 447-5516

Forestry-Related Organizations and Agencies

American Forestry Council
Kathy McGlauflin
Director, Project Learning Tree
1250 Connecticut Ave., NW; Suite 320
Washington, DC 20036
(202) 463-2472

American Forestry Association
Debra Gangloff
American Forestry Association
P.O. Box 2000
Washington, DC 20013

United States Forest Service
Janet Sledge
Office of Public Affairs
U.S. Forest Service, U.S.D.A.
P.O. Box 96090
Washington, DC 22090-6090
(202) 447-5060

International Programs/Organizations

World Wildlife Fund
Angusto Medina
Program Officer, Latin America and Caribbean Program
World Wildlife Fund
1250 Twenty-fourth Street, N.W.
Washington, DC 20037
(202) 778-9608

United States Fish and Wildlife Service
Edward J. McCrea
Senior Staff Specialist, Office of International Affairs
U.S. Fish and Wildlife Service
2058 Interior Building
Washington, DC 20240
(202) 343-3895 or (703) 591-3780

Strand 1

From Research to Application in Environmental Education

The Effects of Nonformal Learning on Selected Environmental Beliefs and Attitudes

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Abstract

Folklore and fears, contributing to misconceptions and negativistic attitudes, influence how students perceive their environment. This study reports on the effects of specific interpretive techniques on changes in information and attitude toward certain wildlife species.

Environmental Education and the Socially-Critical School

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Abstract

A socially-critical school is concerned with critical understanding, critical evaluation and informed commitment to the improvement of society; environmental education has similar rhetoric. The relationship between them is analyzed and discussed.

The idea of a "socially-critical school" (Kemmis, Cole and Suggett, 1983) and a "socially-critical curriculum" (Kemmis, 1986) has become part of the language of education in Australia in recent years. As I have argued elsewhere (Greenall 1987), environmental education should also be "socially-critical:"

> [Environmental education] aims to create possible worlds, or achievable utopias, which are a real improvement on the actual world we inhabit today. Creating such utopias raises practical questions concerned with acting wisely, truly and rightly in the social and political situations in which we find ourselves... Environmental education is about revealing how the world works and how it might be changed... The practice of environmental education in Australian schools has... tended to stress the survival needs of rare species and habitats, ecological processes and wilderness areas. There has been a reluctance to recognize that environments are socially constructed.[1]

This view of environmental education is consistent with that put forward in international documents. For example, the nature of environmental education is such that it "should adopt a critical approach to encourage careful awareness of the various factors involved in the situation" (Unesco, 1980). It should also involve learners in planning their learning experiences, "utilize diverse learning environments and a broad array of educational approaches to teaching/learning" and "focus on current and potential environmental situations" (Unesco, 1978).

These characteristics reveal the common ground between environmental education and a socially-critical orientation to curriculum:

> Education must engage society and social structures immediately, not merely prepare students for later participation. It must engage social issues and give students experience in working on them - experience in critical reflection, social negotiation and the organization of action. Education must develop the power of constructively critical thinking, not just in individuals but also in group processes. The substance of education, according to this orientation, must emphasize social and critically-reflective processes (Kemmis, Cole and Suggett, 1983).

The characteristics of environmental education cited by Unesco are also consistent with emerging challenges to traditional approaches to education. For example, Gough contrasts the conventional paradigm, which is concerned with the distribution of accumulated propositional knowledge with an "ecological paradigm" in which the learner's attention is directed towards her own environment. A curriculum consistent with an ecological paradigm would value an individual's perceptions as a part of education:

> A curriculum which is focussed on practical problems is intrinsically more ecological and holistic than one in which learning is focused on theoretical or technical concerns (Gough, 1987a).

Gough (1987b) has discussed an "ecological paradigm" for education in the context of environmental education and has cautioned that such a paradigm shift will not simply mean more environmental education or other green issues being included in school timetables. In other words, he sees an ecological paradigm as raising the whole issue of schools as institutions of social transformation or social reproduction.

> A paradigm shift involves changes in our total world view, and it may be difficult for most educators ... to accept that the education system in which they practice, and of which they are themselves products, provides a structured misrepresentation of reality, nature and human nature (Gough, 1987b).

Whether acknowledged or not schools do have a close relationship with society: "Schools are socially constructed, sustained and renewed through the actions of people" (Popkewitz, 1983). Skilbeck (1975) suggested that schools can respond to social and cultural change by using a number of different strategies:

— they can "swim with the tide," identifying basic trends and going with, rather than resisting, them

— they can seek to identify and preserve valued elements from the past.

— they might carry on their work, irrespective of what was happening elsewhere.

— they might anticipate future developments and attempt to influence them through the varied means at their disposal.

The last category suggests that schools can be agents of change in society, i.e., reconstructionist, and in the early 1970s there was some willingness on the part of schools to accept this role, rather than being merely socially reproductive or adaptive. In earlier research (Greenall, 1981a) I discussed the climate of innovation and change in Australia in the seventies and argued that environmental education was essentially social reconstructionist in nature. At this time the concept of "reproduction" of the dominant social order as the prime function of schooling was common in the alternative curriculum literature (for example, Apple, 1979). However, Apple soon recognized that this notion was too simple and that "contestation is central to reproduction" (Apple, 1981).

More recently, Kemmis et.al. (1983) have proposed a conceptual structure for critically viewing different types of change in education systems. They propose four possible types of change: **transformation** which is either **positive** or **negative**, and **reproduction** which is either a **diversification** or **extension**, but they do not see them as neat, exclusive categories which can easily be used to describe real situations.

The process of educational reform has a dialectical quality: it involves a tension between change and stability (Popkewitz et.al., 1982; Popkewitz, 1983). Historically, curriculum change has been regarded as having potential for transforming society as a whole. However there is continuous contestation between groups in society regarding the role of schools in shaping the future citizens of society and in passing on the views of the state and its institutions (Kemmis with Fitzclarence, 1986).

With respect to the environment, there is evidence to suggest that there is increasing community awareness of and interest in environmental matters. A 1986 Australian Bureau of Statistics survey indicated that nearly half

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of the civilian population aged 15 years and over were concerned about problems with the environment and that one third of households were actively involved in environmental action (in this instance recycling of resources; Australian Bureau of Statistics, 1986). This community support for the environment is not reflected in the education system and schools. For example, Tribe (1987) noted that "many classroom teachers lack confidence in their ability to educate in the environment much less **for** it" (See also Greenall 1981a and 1987). To use the terms mentioned above, the schools appear to be carrying on their work, irrespective of what is happening elsewhere (Skilbeck, 1975) or they have undergone **negative inoculation** - the reform has failed to overthrow the existing structures and left a residual reactionary force to further change (Kemmis et.al., 1983).

It has been argued previously that environmental education is concerned with social transformation, and while it cannot be denied that many subjects in the traditional curriculum of Australian schools have increased their environmental content there is little evidence that such courses are considering political and moral aspects inherent in environmental education (Greenall, 1981b; Tribe, 1987).

An important research problem is, therefore, to investigate through case studies just how and why schools handle the radical "action" components of ("for") environmental education compared with the less controversial cognitive and skill components. This is the subject of my current research. The problem will involve the study of politics and practices in three contexts - a pedagogical context (between students and teachers); the occupational context of teaching (between the school staff); and a social/cultural context (between school and community; Popkewitz, 1981).

Note

The practice of environmental education in schools in other countries is similar. For example, Disinger (1987) noted that, in United States elementary and secondary schools, environmental education is generally infused into the curriculum through science programs, with an emphasis on nature study or similar biological topics in most (or many) instances.

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Becoming Ecopolitical: Some Insights From Curriculum Inquiry

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Abstract

Ecological theories of perception and deliberative curriculum studies support a view of learning in which learners can (and should) be characterized as "becoming ecopolitical." The implications for curriculum and teaching are described and discussed.

Much of what currently passes for environmental education is a narrow technical response to certain circumstances that are not to our liking, such as depletion of the ozone layer, diminishing energy resources, species loss, pollution and so on. These circumstances justify the kinds of environmental education that are the social equivalents of personal toilet training, but they do not in themselves provide a rationale for curricular forms which transcend technical interests. My project is to work towards transformations of educational practice which will help to develop an ecopolitical culture within which environmental education as it is presently conceived (as an educational palliative for environmental ills) is not necessary (see also Gough, 1987ab, 1989).

The concept of an ecopolitical culture is problematic and speculative, but some of its potential qualities are inherent in "deep ecology," which cultivates a "state of being... that sustains the widest (and deepest) possible **identification**" of oneself with one's environments (Fox, 1986: 87). Deep ecology contrasts with the "shallow environmentalism" of positivist empirical science (and of the conventional school curriculum) which maintains clear distinctions and discontinuities between subject and object and, thus, between humans and other beings, plant and animal, living and non-living, and so on (see Figure 1, appended). A question which curriculum inquiry might illuminate is the extent to which these distinctions are sustained by the act of **naming**, which divides the world into that which is named and everything else. Assigning a name to something constructs the illusion that what has been named is genuinely distinguishable from all else and this may occlude the seamlessness of that which is signified by our words. Thus, one transformation of educational practice that might facilitate the achievement of an ecopolitical culture is the development of a pedagogy which is less dependent on the **naming of objects** than is presently the case.

Some of our most entrenched educational practices stem from empiricist theories of perception and knowledge advanced by eighteenth century philosophers like Locke, Berkeley and Hume. These theories assume that the world is as Newton depicted it and that the transfer of information from an object to a viewer obeys Euclid's geometry. According to this view, individuals can have no sure knowledge of a world outside them - stimuli can yield no direct and immediate information about a three-dimensional world of solid, persistent objects and causal relations. Despite Darwinian challenges (how could such incompetent perceptual systems have had survival value?), educational practice since the onrush of positivist science has not valued an individual's perceptions as a source of knowledge. The meaning of perceptions is held to emerge from intellectual processes of analytic abstraction and logical inference and the prime task of education is to distribute the socially-validated ("objective") knowledge that has been so gained.

Newton's physics and Euclid's geometry have long been displaced (by quantum mechanics and its attendant probabilistic mathematics) but the educational practices that derive from them have persisted. What if human perceptual organs are geared to Einstein's time-space continuum rather than to Euclidean space? Our perceptual systems are likely to have evolved so as to be adapted to the universe as it is rather than to a distorted social construction of it, yet conventional schooling is geared to the materialistic, deterministic, atomistic, reductionist and objective vision of the universe that has been rendered insupportable by modern physics.

The assumption that the meaning of perceptions (such as the perception of order) can arise only from intellectual cogitation is directly challenged by the work of Fritz Heider (1959), J.J. Gibson (1979) and others. They demonstrate the plausibility of ecological theories of perception which hold that the environment has an informational structure at the level of objects and their causal interactions and that human perceptual systems have evolved to detect such information.

> . . . there is ample evidence that the senses are not only genetically preattuned but become more sensitively calibrated to pick up those exigencies of the environment that bear directly on the survival, success and well-being of the perceiver - what has sometimes been called the "education of attention" (Shaw and Pittenger, 1977:107).

Eighteenth-century epistemology has led us to believe that "real knowledge is locked up in the storehouses of knowledge that are so jealously guarded by a priesthood of scholars and scientists" (Emery, 1981:7) and that access to these storehouses is obtained only through years of schooling in the disciplines that are our means of organizing their contents. Ecological theories of perception suggest that unlimited information is present in our personal, social and physical environments and that with an "education of attention" we can access as much of it as we need.

The diminished credibility of "objective" knowledge is also evident in the recent strengthening of "inner-directed" values (ecological, humane, spiritual) in Western industrialized countries and a parallel shift in developing countries away from Western materialism and towards a reassertion of native cultural values and beliefs. "The change in both cases is fundamentally a shift in our attitude toward our inner, subjective experience, affirming its importance and its validity" (Harman, 1985:325). This attitude change is a departure from the norms of the recent past but the strengthened beliefs are no novelty in the longer term history of Western culture and education. In the Aristotelean scholastic curriculum which predominated in Europe until the eighteenth century, no strong distinction was made between matters of fact and matters of value (Reid, 1981). The ideal of scientific detachment, or of any attempt to eliminate human values from supposedly "objective" worldviews, was foreign to this scholarly tradition, regardless of whether one was studying nature, human nature or the supernatural.

The disciplines of the medieval scholastic curriculum were conceived as practical arts (rather than as theoretic "sciences"). The essential purposes of studying literature, religion, natural history or social history were similar:

to help resolve the practical problems faced by humans when their desires fail to match their circumstances. These disciplines focused on the interrelationships between human moral purposes and the personal, social and physical environments in which they were seen to be situated. Thus the goal of Aristotelean scholarship was **practical** ("to perform good works"), rather than **theoretic** (to discover or demonstrate some final good or universal truth; McKeon, 1977:208). This goal changed under the influence of "scientific method" and many of the humane disciplines were reconceived as social "sciences."

In the language of ancient Greece "practical" is indistinguishable from "political" (see Lobkowicz, 1967) and this common ancestry points to some complementarities between contemporary ecopolitics and the revival of a neo-Aristotelean conception of "practical" curriculum study, initially explicated by Joseph Schwab (1969, 1971, 1973), and refined further under the name of "deliberative" curriculum study (Reid;1981; Holt;1987). The deliberative position is that curriculum problems are in essence practical rather than theoretic. Such problems are also **ecopolitical** in that they can only be resolved in the light of complex human/environment interrelationships which must be treated holistically rather than analytically and which necessarily involve subjectivity.

With two thousand years of hindsight Aristotle's concepts of "man" and of the **polis** may seem too narrow, but his sense of their relationship retains its wisdom: "man" is still a political animal who becomes what he is capable of becoming in the context of the **polis.** We must now expand "man" to **human** and expand the **polis** to the **ecopolis** - to the larger context of the evolving biosphere.

Ecological theories of perception and deliberative curriculum theorizing support an education in "becoming ecopolitical" - indeed, they support an education in becoming **deeply** ecopolitical. The moral commitments of "becoming ecopolitical" may seem to be virtually identical with those of "deep ecology," but I prefer the term "ecopolitical" because it suggests that identifying oneself with **ecopolis** is a matter of practical (i.e., political) choice, decision and action rather than the contemplation of a **logos.** I also prefer to think of "**becoming** ecopolitical," rather than of attaining the "state of **being**" sought by deep ecologists, because human identification with the continuity, interdependence, and community of all life is dynamic and transactional and not a static or stable "state."

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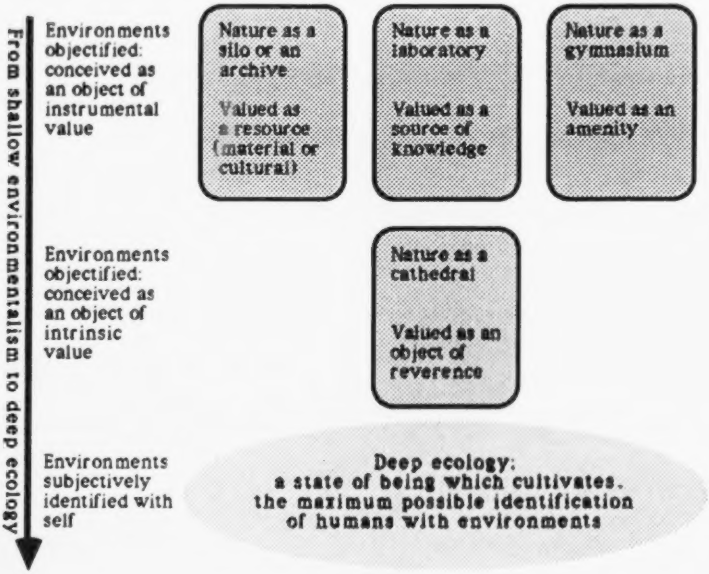
Appendix

Figure 1: From shallow environmentalism to deep ecology


From shallow environmentalism to deep ecology
Environments objectified: conceived as an object of instrumental value
Nature as a silo or an archive
Valued as a resource (material or cultural)
Nature as a laboratory
Valued as a source of knowledge
Nature as a gymnasium
Valued as an amenity
Environments objectified: conceived as an object of intrinsic value
Nature as a cathedral
Valued as an object of reverence
Environments subjectively identified with self
Deep ecology: a state of being which cultivates, the maximum possible identification of humans with environments

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The STSE Emphasis in Education - How a Canadian Province Encorporated Environmental Literacy within its Educational Policy Mandate

Dr. Paul Hart, Faculty of Education
University of Regina
Regina, Saskatchewan, Canada

Abstract

The purpose of this presentation is to examine, within the more general context of educational policy development, how environmental education was encorporated into the core curriculum of a Canadian province. The presentation also examines how the STS emphasis in science education can facilitate efforts of environmental educators to establish a place for "EE" within formal school programs.

What We "Know" About Citizenship Behavior in Environmental Education - Part 1

Harold R. Hungerford, Curriculum and Instruction
Southern Illinois University
Jody Stone
University of Northern Iowa
Archibald Sia
University of Tampa
Dan Sivek
Wisconsin Department of Natural Resources
and
Tom Marcinkowski
Maryville College

Abstract

A major challenge for environmental education is to move learners to take responsible social action toward the solution of environmental issues. This panel will present and discuss recent research focused on specific variables associated with citizen participation in environmental problem-solving.

Environmental Education, Action, and Problem Solving: A Need for Clarity

Bob Jickling, Yukon College
Whitehorse, Yukon, Canada

Abstract

Action and problem solving are two concepts, frequently linked, which are central to many goal statements for environmental education. However, it is often not clear what is meant by these terms and the extent to which they are educationally justifiable. This paper examines some misconceptions about the roles of action and problem solving in environmental education.

Answering Tomorrow's Questions

Deborah B. Keammerer
Stoecker-Keammerer Ecological Consultants
Boulder, Colroado

Abstract

Increasing impact to the global ecosystems has become an issue for many concerned with the environment. Reversing this process, even on small sites, requires insight into the ecological functioning of natural communities and an understanding of the techniques available to speed a site's recovery process. A survey to determine the extent to which existing curriculums meet these needs was begun this year by the Society for Ecological Restoration and Management.

Developing Model Learner Outcomes for Environmental Education

John C. Miller, Environmental Education Specialist
Minnesota Department of Education
St. Paul, Minnesota

Abstract

An overview of the cyclical process involved with: Researching the effectiveness, efficiency and future need for Environmental Education; Developing/Writing the Environmental Education Model Learner Outcome Document. Designing services and staff development; and statewide implementation of the program.

Secondary School Science Teachers' Perceptions of Science, Technology, Society, and Environment (STSE).

Tim Molnar
Saskatchewan Outdoor and Environmental Education Association
Regina, Saskatchewan, Canada

Abstract

Science teachers (n=288) perceive STSE as an important theme of study in secondary school science. Teachers' perceptions of curriculum approach, teaching strategies, and staff development indicate problems may be encountered in implementing this theme.

Teaching Teachers: Tips for an EE Inservice

Martha C. Monroe
University of Michigan
Ann Arbor, Michigan

Abstract

We'll explore important guidelines for teaching teachers based on a brief review of the staff development literature and our experience leading afternoon inservices and teaching credit courses. Certain design components could make your training programs more successful.

It is not unusual for environmental educators from nature centers, museums, zoos, and resource agencies to be called upon to teach teachers. Loaded with fun facts and an abundance of handouts, they provide teachers with a wealth of tremendous ideas that should motivate and interest students. Somewhere between the inservice and the classroom, however, many of these ideas and activities are misplaced, filed in piles, and lost. Frustrated with the outcome, a common response is to blame the teachers for not listening or the circumstances for not providing enough time. Instead, there may be small changes in the inservice approach that could improve the teachers' receptivity and ability to implement the EE ideas.

The literature in staff development is helpful in pointing out that the most successful endeavors in curriculum change are based on the teachers' involvement in their own professional development. The opportunity to reflect on their teaching practice in a supportive, secure atmosphere encourages teachers to lower their resistance to change (Devaney, 1979). Innovative ideas are more likely to become part of the curriculum if staff workshops are accompanied by frequent meetings, teacher participation in decisions, classroom assistance, and on-going feedback (McLaughlin and Marsh, 1979). In addition to these guidelines, Huston's (1981) summary of the research in inservice education includes: obtain administrative support, model good teaching, intend to enhance the practice of skilled professionals, meet an assessed need, and encourage collaboration among teachers.

Certainly all these goals cannot be fulfilled by the outside resource person who appears for an afternoon inservice workshop, but they suggest a very useful strategy and a important foundation for teacher training. When coupled with some tips from learning theory and common sense, three main points should be kept in mind when developing inservice programs:

1) Meet their needs.
2) Respect their expertise.
3) Encourage teachers to try something new.

1. Meeting their needs.

Establishing contact with a school district may be challenging if you are perceived as selling environmental education without meaningful connections to what the school administration and staff care about. For EE to be accepted, teachers must perceive a need for change and recognize EE as part of the solution. Therefore, your goal should be to help them realize you can assist them.

— Use news events (like the oil spill) and educational rhetoric (such as STS) to validate your program and the importance of EE and to help them understand what you can offer.

— Cultivate friendships with well respected teachers who can speak for you from the inside, suggesting you as an important resource for teachers.

— Be willing to serve the school's needs by sitting on a curriculum committee or judging a science fair. When they need an outside resource person, they should think of you.

— Find out their timeline for making decisions on inservice training, their budget, and their current curriculum goals and package your service to meet their constraints. The interdisciplinarity of EE means you can enhance any element of their program—from home economics to literature. Of course, meeting their needs assumes EE is a need. If it isn't their need, wait for another year.

2. Respecting and using their expertise.

Teachers are experts. They are skilled professionals with years of experience in the classroom. Teaching people who already have great skill and knowledge is tricky, for it is easy to bore them with information they've already heard. On the other hand, if you avoid their knowledge base (educational techniques) and launch into unfamiliar territory (environmental concepts, perhaps) you risk losing them. Teaching teachers requires treading a carefully balanced path between the familiar and the unknown such that they want to learn more.

— Find out what they already know and what they hope to learn. Use surveys, questions, or informal discussions. Again, meet their needs. In the program, start on the edge of familiar territory and entice them into the unknown with questions or meaningful connections to their concerns.

— Let them plan the inservice by choosing among options within your framework. Encouraging their participation and offering choices eliminates the guessing game; they will tell you what appeals to them. Your job is to offer the appropriate choices and to create a program from those chosen. Be strategic about who you ask for input as the teachers' opinions might differ from their administrators.

— Design opportunities for the teachers to use their expertise. A small group assignment, like evaluating an activity, listing five important ingredients, or outlining a unit will help your teachers engage their own knowledge and add the new information or skills. Working in small groups can foster an atmosphere of professional respect that recognizes their contributions.

3. Encouraging teachers to try something new.

One inservice, or even one course, is not likely to make an expert environmental educator out of anyone. Rather than setting sweeping curriculum change as your goal, overwhelming the participants, and disappointing yourself, you might try lowering your sights. A very successful program may only attempt to encourage teachers to try one new activity or resource. This goal should be reflected in the structure of the inservice.

— Limit yourself to five main ideas; don't try to cover the world of EE and all the curriculum guides on your shelf. Choose a few points that are relevant and meaningful and save the rest for future workshops.

— Build an atmosphere of trust to support new ventures. It is hard to break out of one mold and try something that could flop. Encourage teachers to share their experiences and ideas about what works in the classroom and how they salvage an activity that doesn't. Food, small group work, and coffee breaks create opportunities to discuss their practices and fears.

— Introduce the "new" ideas as not so new after all. If EE is effectively connected to their knowledge and experience, the "new" won't seem so foreboding. Making the right connections necessitates that you know something about the audience, and/or that they participate in discussions. The use of questions can stimulate thought, reflection, and discussion. Questions can pull ideas from the teachers' expertise ("To what degree are your students comfortable expressing their opinions on a controversial issue?") and direct their attention to relevant issues.

— Practice a few activities. Elementary teachers are often quite willing to participate in activities designed for students. They also find it meaningful to step back from the activity to critique its usefulness, evaluate the design, and discuss its demonstration of educational theory. This opportunity enables teachers to practice a level of reflection appropriate for professional development and for their own dabbling in EE.

Ultimately, the most successful inservice program meets the perceived needs of the school staff, involves them in their professional development, and supports their efforts at change on an on-going basis. In building to this goal, environmental education resource people can take steps to structure their programs around the needs of the schools and teachers, to recognize and respect the expertise teachers bring to inservice programs, and to design the program to support small changes toward EE in the classroom. Over time these resource people may find themselves called on again and again to provide additional "new" ideas for small changes.

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The Effects of Issue Investigation and Action Training on Characteristics Associated with Environmental Behavior

John Ramsey, Curriculum and Instruction
Southern Illinois University
Carbondale, Illinois

Abstract

Little research focuses at the instructional effects of EE on learners' overt environmental behavior. This study examined selected cognitive, affective, and behavioral outcomes of the use of an EE methodology directed at the analysis, investigation, and remediation of environmental issues in a middle school population.

Environmental Technology Education and Demonstration Centers

Dr. W. J. "Rocky" Rohwedder
Environmental Studies and Planning, Sonoma State University
Rohnert Park, California

Abstract

Results of recent research on model site-based centers, focusing on environmental technology education, demonstration and action-oriented research. Research focused on organizational image, funding, management and technological innovation. Methods included interviews, archival data analysis and site visitations.

Comparative Analysis of Five Teaching Models in Environmental Education

Lucie Sauve
Richelieu, Quebec, Canada

Abstract

Five teaching models specially designed for environmental education in U.S.A., Israel and France, are analyzed with the conceptual framework developed by JOYCE and WEIL (1986). They are compared one to each other so that we can clearly identify their differences, their similarities and their complementarity.

Acid Rain - Are Urban Nitrates Killing Trees?

Dr. Judith M. Schultz
University of Cincinnati
Cincinnati, Ohio

Abstract

Preliminary results of a $50,000 research project directed by the presenter on urban nitrates at the University of Cincinnati will be reviewed with guidance for educators in understanding the complexities of the acid deposition phenomenon.

Teachers' Perceptions of Barriers to Environmental Education

Daphne R. Sewing
Utah Division of Wildlife Resources
Salt Lake City, Utah

Abstract

Personal interviews with elementary teachers were conducted to identify and determine the relative importance of barriers to environmental education (EE) in Palouse-region public schools. Results indicated that *lack of time (both in the school day and for preparation) was the most important barrier. Other important logistical barriers were lack of instructional materials and lack of funding. Conceptual barriers included a nearly exclusive focus on science and an emphasis on the cognitive aspects of EE. Another barrier stemmed from teachers' misgivings about their own competence to teach EE. Although teachers generally had positive attitudes toward EE, most lacked the commitment to actually teach EE. Recommendations for reducing these barriers are presented, as are suggestions for future research.*

The Effect of an Issue Investigation and Action Training Extended Case Study on the Overt Citizenship Behavior of Fifth Grade Students

Patricia R. Simpson, Curriculum and Instruction
Southern Illinois University
Carbondale, Illinois

Abstract

The presentation will report on the results of a quasi-experimental study which investigated the effects of an extended wildlife management case study. The variables examined in this study include the overt citizenship behavior of fifth grade students and additional precursors for that behavior.

Preservice Elementary Teachers' Conceptions of the Water Cycle

Sandra S. Van Thiel
Siloam Springs, Arkansas

Abstract

The presentation identifies water cycle concepts which preservice elementary teachers hold which are: 1) scientifically accurate, 2) "alternative conceptions," 3) unknown concepts, and 4) similar to elementary students' conceptions. The profile of preservice teachers who hold these concepts are identified.

What We "Know" About Citizenship Behavior in Environmental Education - Part II

Trudi L. Volk and John M. Ramsey
Curriculum and Instruction, Southern Illinois University
Carbondale, Illinois

Abstract

Continuing the discussion of research began in Part I; this session will report additional educational research related to responsible citizenship behavior in the environmental realm. A major focus will be on the implications of this research for both formal and nonformal environmental educators.

Strand 2

Interdisciplinary and Interagency Cooperative Ventures

Working Together for the Conservation of Seabirds on the North Shore of the Gulf of St. Lawrence

Kathleen A. Blanchard
Atlantic Center for the Environment
Ipswich, Maine

Abstract

Ten years of educational programs on the Quebec North Shore contributed to a decline in illegal seabird harvest, improvements in local knowledge about wildlife laws, and population increases for several species.

This paper reports on some positive results from a twelve-year project on the conservation of nesting seabirds on the North Shore of the Gulf of St. Lawrence. It describes the combined efforts of a not-for-profit conservation organization, a federal wildlife agency, and citizens on the local level. It suggests that building multi-organizational alliances is essential to solving today's conservation problems, and has become a dominant strategy of wildlife management during the last quarter of this century. The importance of building local support for conservation is strongly evidenced in this issue.

The Problem and Its Context

Populations of nesting seabirds on the North Shore of the Gulf of St. Lawrence experienced dramatic declines during the period 1955-1977. Razorbills *(Alca torda)* dropped from approximately 18,500 to about 3,000 individuals (84 percent decline), and Atlantic puffins *(Fratercula arctica)* dropped from nearly 62,000 to less than 15,000 (76 percent decline). Population decreases also occurred among common eider *(Somateria mollissima)*, common murre *(Uria aalge)*, and back guillemot *(Cepphurs grylle)* (Chapdelaine 1980). Deteriorating sanctuary conditions, disturbance, and illegal harvest of birds and eggs by residents were found to be the chief factors contributing to the declines (Blanchard 1984). Since 1925 the Canadian Wildlife Services (CWS) has conducted censuses of nesting seabirds on sanctuaries along the coast. The CWS provides enforcement of migratory bird and sanctuary regulations by means of wardens stationed along the coast.

A 1981 survey by the Quebec-Labrador Foundation (QLF) of heads-of-households along the coast found that residents were lacking in knowledge of wildlife laws, that their attitudes toward wildlife were utilitarian, and that most families engaged in harvesting seabirds, seaducks, or their eggs. Results included the following: 94 percent believed it was acceptable to harvest seabirds for food; 65 percent did not know that murres were fully protected; 81 percent favored an open season on murres. Residents hunted or gathered the eggs of all possible alcids, gulls, terns, and ducks. The estimated total annual harvest by residents of seabirds and seaducks was found to be 98,000 (Blanchard 1984). A subsequent study of children revealed abundant misconceptions about biology, conservation, and wildlife laws, and widespread utilitarian attitudes toward seabirds (Hallowell 1985). Since the early 1960s QLF has conducted educational programs for residents of the Lower North Shore. QLF is a not-for-profit organization incorporated in both Canada and the United States, which runs a variety of conservation programs in rural areas of eastern Canada and northern New England under its environmental division, the Atlantic Center for the Environment.

Most illegal harvest occurs along the remote section of the coast referred to as the Lower North Shore of Quebec. There are 15 villages with a total of approximately 5,900 residents, 88 percent of whom are non-native, and of that 79 percent are anglophone. Average village size is 350; there are no roads linking villages to the outside world. The economy is market-oriented, with more than one-half the work force in 1981 employed in the cod industry. Seal fishing, trapping, bird hunting, and wood gathering are important seasonal subsistence activities that hold traditional and recreational values. Due to the rapid development of improved services, greater availability of imported foods, and increased purchasing power since the 1960's, these activities are no longer necessary for survival on the coast.

The Response

The Canadian Wildlife Service Quebec Region increased its enforcement efforts beginning in 1978 with combined CWS and Royal Canadian Mounted Police air and ground patrols. By 1988 CWS increased the number of migratory bird wardens to six plus an area supervisor; meanwhile, several additional wardens had been hired by the Canadian Parks Service along the Middle North Shore. Beginning in 1978 and continuing through 1988, CWS conducted research into causes of seabird decline other than illegal harvest. Educational efforts included village visits in 1978, 1983, and 1987 and the publishing of an information booklet and an activity guide which QLF staff distributed along the coast. In 1987 CWS erected signs in the villages explaining the boundaries and regulations surrounding the sanctuaries. From 1978 to the present, CWS gave sanction to QLF for its educational efforts on St. Mary's Island, the region's most important sanctuary. The remote working conditions and delicate nature of the issue made for a bold and challenging alliance between a federal agency and a grassroots organization. By 1988 the relationship was sufficiently strong as to prompt CWS to enter into negotiations with Transport Canada on the transfer of ownership of two lightstation buildings at St. Mary's Island, one building to be owned by QLF and the local wildlife society.

In 1978, the Quebec-Labrador Foundation began its Marine Bird Conservation Project with the goal of helping to restore depleted seabird populations while preserving the integrity of local culture. Its mission was to accomplish meaningful change by fostering a new generation of knowledgeable, concerned, and motivated citizens who would take an active role in the conservation of their own resources. Its objectives were as follows: 1) teach practical seabird biology and conservation principles; 2) encourage the development of a conservation ethic; 3) train residents in conservation leadership; and 4) build local support for wildlife policies and regulations. QLF introduced education, research, and conservation activities over an eleven year period to residents throughout the Lower North Shore. Activities were funded by a variety of charitable foundations, government agencies, and other conservation organizations, and were conducted in collaboration with CWS, conservation groups with an interest in the coast, and the local population.

Youth Programs

The project began with a summer program on seabird conservation at the St. Mary's Island Sanctuary, where local children are taught seabird biology, sanctuary etiquette, and wildlife law. Short- and long-term evaluations indicate that students learn important concepts and develop attitudes that are broader, more positive, and enhanced. Furthermore, students' family members demonstrate increased knowledge, greater concern, and some changes in hunting patterns. The intensive four-day sessions are the most effective strategy in promoting meaningful cognitive and affective change among youth. An offshoot of the St. Mary's program began in 1988 at the Greenly Island Sanctuary.

QLF also started two youth conservation clubs and conducted summer programs in four villages. QLF produced a play about seabird conservation, which was performed by children of families that illegally harvest; the technique proved effective in heightening public awareness of sensitive issues in a nonconfrontational manner. School programs were conducted from 1985 to 1988 and included the production and implementation of a slide-tape show about seabirds and a school poster contest. Final judging for the contest occurred in Montreal with representatives from several Canadian conservation organizations. The winning posters appear in a 1989 calendar that has been distributed coastwide and among conservationists throughout North America and abroad.

Leadership Training

More than 40 local university, college, and secondary school students have been trained or given summer employment in conservation teaching and research. Lack of placement into permanent conservation jobs on the coast is a perpetual obstacle; but as a result of this program, fishermen, carpenters, merchants, and other members of the work force are helping to shape a conservation ethic and are influencing more responsible behavior among residents. In 1984 a group of concerned residents started the first local wildlife society. Grants to QLF created more than a dozen jobs for members of the society and provided for initial refurbishing of the society's historic meeting house.

Information and Education Materials

During the past six years QLF produced the following: slide-tape show for elementary and middle grades (1989), teacher's guide to the play, "Dreambird" (1989), poster about seabirds of the North Shore (1983), citizen's guide to seabird conservation (with CWS) (1988), and calendar of children's posters and poems about seabirds (1989). The publications attempt to be easy-to-read and are geared to local dialect and customs. As tools for learning, their effectiveness locally is dependent on the relative success of their implementation. All have been introduced with personal contact by QLF staff and local endorsement where possible.

In conjunction with QLF and CWS, the Canadian Broadcasting Corporation in 1987 produced a documentary television program about the issue, and in 1989 is producing an eleven-part radio series about local environmental issues including seabirds. In both cases, the opinions of local residents who are interviewed are the crux of the programs' messages.

Building Alliances

In order to accomplish its many objectives in such a remote region, QLF engaged the financial and in-kind support of a variety of conservation organizations throughout Quebec and other parts of Canada. These included the Province of Quebec Society for the Protection of Birds, Wildlife Habitat Canada, World Wildlife Fund, the Union Quebecoise pour la Conservation de La Nature, and other groups. One consequence of this involvement has been the building of alliances throughout eastern Canada whose members are able and motivated to respond quickly to urgent matters affecting the region's residents and resources. When in 1986 government cutbacks threatened to eliminate CWS's last available person-year for wardens, conservation organizations mobilized to convince federal authorities to reverse their decision. When in 1988 Hydro Quebec proposed to move its generating plant adjacent to the largest puffin colony on the coast, local residents responded by contacting QLF, which in turn contacted CWS and other groups. Another consequence of these alliances has been greater sensitivity within the more urban-based conservation community toward problems in outlying areas.

The importance of collaborative efforts among CWS, QLF, and local citizens in this issue cannot be overstated. When federal budget cuts prevented CWS from hiring technicians to conduct the 1988 seabird census, QLF supplied student help to get the job done. When equipment broke down and fuel was stolen from the St. Mary's lightstation just before QLF's youth program began, CWS provided the backup fuel and repairs. Joint participation between CWS and QLF on radio, at conferences, in publications, and in research are now commonplace. Meanwhile, local residents provide tremendous on-site support by way of supplies, housing, guidance and more importantly visible leadership. They participate in publications such as the calendar and citizen's guide, community events, and local radio program. They raise supplemental funds to sponsor youth programs. They post community notices to protect the sanctuaries. They willingly endure the barrage of social research and interviews by the media. They perceive themselves as the wherewithal for meaningful change.

Survey Results

Results of the 1988 census of nesting seabirds on the North Shore show an increase in all families of birds nesting on sanctuaries. As compared to the number of birds reported earlier, razorbills increased to over 7,000 individuals (233 percent increase over the 1977 figures). Atlantic puffins increased to more than 35,000 (133 percent increase). Increases also occurred among common eider (8,500), common murre (26,000), and three species of gulls. The two factors cited as explanation for these improvements are: 1) stronger conservation program involving better enforcement and abundant education, and 2) probable reduced competition for available small prey fish due to increased commercial exploitation of predatory fish (Chapdelaine and Brousseau in press).

A 1988 repeat of the 1981 survey of Lower North Shore heads of households showed improvements in local knowledge, attitudes, and hunting behavior. For example, only 33 percent did not know that murres were fully protected, and those favoring an open season on murres dropped to 66 percent. The average estimated percent of families who harvest birds and eggs in each village dropped from 75 percent in 1981 to 49 percent in 1988. The percent reporting they need birds and eggs dropped from 53 to 29 percent. The average number of birds a family needs in one year dropped from 75 to 29. Certain attitudes remain the same: for example, 90 percent believe that the most common reason why people harvest seabirds and eggs is for food, and 92 percent believe that harvesting seabirds for food is acceptable.

The majority of respondents believe the laws are too restrictive concerning gulls and eiders: 66 percent stated they should be allowed to harvest gull eggs, 62 percent believe they should be allowed to hunt eiders in the spring. Overall, 88 percent stated that they were concerned about the future number of seabirds and 92 percent said that something should be done to better protect the birds. Other results, including those less quantifiable, are reported in other papers. The popularity of the St. Mary's Island youth program, increased memberships in the local wildlife society, and the growing interest in conservation jobs are but a few of the subjective indicators of change among the local population.

Conclusions

The rapid decline in populations of nesting seabirds on the North Shore of the Gulf of St. Lawrence during the final quarter of this century prompted the Quebec-Labrador Foundation and the Canadian Wildlife Service to address the threat due to illegal harvest and to collaborate on programs of education, enforcement, and research. Their goal was to restore the depleted bird populations in a manner sensitive to local culture and to engage the active participation of residents. The combined efforts of QLF, CWS, and local citizens forged a formidable alliance that is resulting in meaningful change. Populations of nesting seabirds are currently increasing, while residents are more knowledgeable, concerned, and motivated toward conservation.

Ingredients to the success of this project may be summed up in five characteristics: 1) a shared **purpose** to restore depleted wildlife populations while maintaining the integrity of local culture; 2) **patience** to await the slow recovery of seabird populations and the development of a broader conservation ethic among citizens; 3) **persistence** to withstand hardships and obstacles of working in a remote region; 4) **pride** — especially among local people — for the region's heritage; and 5) **perspective** gained by sharing strategies with conservationists working in other rural areas of the world.

The alliances formed in recent years over the conservation of seabirds on the North Shore of the Gulf of St. Lawrence are but one example of a growing trend among wildlife managers to collaborate with local people and nongovernmental organizations in conservation. Furthermore, on the North Shore of the Gulf of St. Lawrence, these alliances represent a new era since the turn of the century in the history of seabird conservation. The period 1900-1925 was marked by **early conservation efforts** in the form of an international treaty and regulations, plus the shaping of a new conservation ethic. The years 1926 to 1949 formed a **period of restoration** in which seabird populations recovered due to the creation of sanctuaries and the strict enforcement of regulations. The 1950s to 1977 saw a **prioritization** of effort as federal budget restrictions drastically reduced the enforcement efforts and public sentiment reached an all-time low. But from 1978 to the present, a **building of alliances** among CWS, QLF, local citizens, and other conservation organizations has engendered a new philosophy of shared responsibility, sprung new sources of funds, and ignited local participation in conservation.

All parties concerned will need to work together in the future as more complex threats to seabirds, such as pollution and the interaction of commercial fisheries, become dominant over illegal harvest. In this way, the issue of seabird conservation on the North Shore of the Gulf of St. Lawrence is but a microcosmic example of the strategies needed in order to face the challenges of the global environment during the last part of this century.

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Interagency Support for Environmental Education

Robert Caskey, Colorado Division of Wildlife
and
Kurt Cunningham, Colorado Department of Education
Denver, Colorado

Abstract

The state Division of Wildlife and Department of Education support an environmental/conservation education position as a cooperative endeavor. The mechanics and success of this thirteen year program will be discussed in this session.

Environmental Education: A Community Venture

Chuck Clark
Buena Vista, Colorado

Abstract

Environmental organizations, schools, community and governmental agencies initiate partnerships through "Awareness to Action" for students when they develop a community and school environmental education resource, a conservation camp, and a nature area.

Buena Vista is a small rural mountain valley town in Chaffee County. Located in the center of Colorado, the twelve 14,000 foot Collegiate Peaks surrounding this community dwarf whatever impacts a town of 2,500 could have on the visual beauty of the area. In the valley flows the Arkansas River. Noted for its whitewater experiences and surrounding geographic splendor, the Arkansas Valley area is a haven for numerous outdoor recreational opportunities. From skiing to fishing; snowmobiling to hunting, Buena Vista has the amenities for the year round outdoor enthusiast. The Buena Vista area is also noted for its wide-range of ecological diversity.

Because of the importance of protecting the natural resource for the benefit of the local economy, it was determined that outdoor education was important in the local schools. It was found, however, that students were ill equipped with the knowledge of how to survive, and be safe and enjoy our natural surroundings. Students also demonstrated a low awareness of the concepts about the biophysical environment they lived in.

It was apparent that classes in resource conservation coupled with outdoor survival skills were needed. The elementary level had done a good job with the "Hug-a-Tree" program and the middle school looked to provide the extension through a nine-week class called Conservation and Outdoor Life.

The new sixth grade program then initiated what was to become a K-12 environmental education program for the entire school district.

Conservation and Outdoor Life

A course called Conservation and Outdoor Life was developed. The course exposes students to many environmental concerns that affect life in the Arkansas River Valley. A student learns through many outdoor experiences how to be a better citizen, how to be safe and survive in, and enjoy the outdoors. Principles learned about the local environment are also applied to global issues.

Students in this class learn how to build primitive camps, make survival kits, plan and go on backpacking and cross country ski trips, learn to use a map and compass. They also learn about their responsibilities for the environment and sharing this consciousness with others.

Although agriculture in Buena Vista is not the major influence it once was, conservation practices in soil and water conservation are taught to young people. Students live in an area surrounded by more than 80% public lands and there is growing pressure for use of these lands. People in the United States have access to these lands and need to know how they can care for them.

Students have also been involved in developing a six acre tract of school property along Cottonwood Creek into an environmental study area for the community. The E. Alfred Marquard Nature Area will serve as a monument to increased environmental awareness. Other organizations in the area are also making enormous contributions to this cause. Maintenance, construction, and learning activities related to the nature area are an integral part of the Conservation and Outdoor Life curriculum.

This class makes students aware of the need for cooperation between individuals, political entities, and governmental agencies. Students have the opportunity to work with valuable resources in the community and to help solve complex environmental issues. Through environmental education and involvement, students have influenced decisions affecting their future.

The Nature Area

How did the school district develop outdoor activities and establish an outdoor classroom? How were students invited to get involved in learning through firsthand experiences?

In Buena Vista, students were invited to help in planning and developing the six acre nature center on the school grounds. At the grass-roots level, the planning, design, and construction of an outdoor education facility provided the "buy-in" that educators look for to get students involved in their education. As it turns out, it was also a wonderful way to improve the appearance of the school grounds.

The student-developed nature area involves youth in a community project. Funded by the town and a grant acquired through the Colorado Division of Wildlife, the design and construction included outdoor classroom seating, ponds, footpaths, trails, bridges, fishing access, and learning stations (a self-guided interpretive program).

The Marquard Nature Area is a community project that involves students as well as other organizations. Organizations such as Trout Unlimited, the Audubon Society, and the Garden Club were instrumental in working with students on a variety of construction projects.

Agencies of local, state, and federal governments were also valuable resources in the development of the nature area. The Colorado State Forest Service, Colorado Division of Wildlife, and the Town of Buena Vista serve in many capacities. The U.S. Soil Conservation Service, C.S.U. Cooperative Extension Service, and the Environmental Protection Agency round out the list of major contributors of advice and information.

But the project also serves the community, the state, and everyone else who wishes to visit or study a mountain stream ecosystem. The project has received national recognition by winning the "President's Environmental Youth Award," and the "Take Pride In America" program. Most of all, however, the nature area improved students' awareness of and appreciation for their surroundings.

The Conservation Camp

As young people mature and look back upon their school years, they often recall special events or projects. It might be a special teacher or class or something they learned. The subtleties of learning mold and change the behavior of children over time. These are not always recognizable by the learner, but have a pronounced effect on the whole person. Once in a while there are things boys and girls will remember that will make it possible for them to internalize abstract concepts into a more personal awareness of the world around them and make it real.

The four-day conservation camp makes the world come alive. It makes the interconnectedness of the outdoors, living things, and the satisfaction of our basic needs more real to kids. It also gets many of their parents involved in a school project.

The camp does this through experiential learning. The experiences provide contact with natural resources and provide environmental interaction with their environment. Hands-on activities lead students from "environmental awareness to responsible action," physically and socially. They not only learn to live with the biophysical environment, but they learn to live with one another.

The awareness and understanding gained through this association stimulates all the senses of students, and they remember. Children become aware of their dependence on natural resources and their role as citizens in making good decisions about the environment.

More than anything else, students are made aware at the camp that they are an inseparable part of a system, a system consisting of people, culture, and nature. They learn they have the ability to alter it through their actions, and they will be affected by their decisions. Students learn that they will eventually be held accountable for their actions and that the quality of their life will depend on the care they give to the planet.

The nature area, the camp, and the nine-week course in conservation for sixth graders cover only a portion of environmental situations that arise in a student's daily life. Teachable moments are found everywhere, in math class, science, social studies, language, physical education, and music. Teachable moments are even found in home economics, shop, art, and foreign language classes. The environment surrounds us completely; environmental education is everyone's responsibility.

The infusion of environmental education into every subject area has been difficult. However, it is being accomplished in Buena Vista through the accountability committee process. The accountability committees in Buena Vista have recommended to the school board that each teacher receive inservice training on how to infuse environmental education into every grade and every subject area. This is being achieved initially through the use of supplemental materials from Project WILD and Project Learning Tree. As environmental education grows in acceptance, it is expected that it will increasingly be integrated into the entire curriculum.

Buena Vista school are proud of their accomplishments in environmental education, but there are many hurdles yet to overcome. These barriers include misconceptions that are common among many educators such as: 1) that environmental education is for science teachers, 2) environmental education is only for white - upper middle class people, and 3) "we have too much to do already."

By increasing the awareness our educators have about environmental education, many misconceptions are being eliminated. It is essential that this process continue and it is important to communicate our successes. Equally important to a program's success, however, is the realization that environmental educators must persevere in involving students and community in the grass-roots process of environmental awareness.

Four Years Into the Wisconsin Environmental Education Mandate

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Dr. Randall Champeau, Associate Professor of Environmental Education
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Abstract

In 1985, legislation was passed in Wisconsin requiring all school districts to develop, implement and evaluate K-12 Environmental Education curriculums by 1991. In addressing these mandates, school districts face several barriers. This presentation deals with what these barriers are and how they are being addressed.

In 1985, Wisconsin mandated the incorporation of environmental education into its public school curriculum. By 1991, all school districts in Wisconsin are required to develop, implement and evaluate a K-12 environmental education (EE) curriculum. In addressing these efforts, school districts have experienced a number of obstacles, among these a lack of funding and professional resources at the state level to aid district EE curriculum plan development and teacher training efforts.

Wisconsin Approaches to Environmental Education

Wisconsin has a history of commitment to educating its citizens about the environment. In response to the accelerating loss of soils, timber and wildlife habitat, Wisconsin, in 1935, became one of the first states to establish teacher training and curriculum development requirements in natural resources and their conservation.

As environmental problems worsened it became evident in the 1960's and 1970's that a new educational approach was needed to resolve environmental problems. Conservation education approaches utilized prior to the 1970's were inadequate in dealing with environmental issue resolution and the values dimension of issue resolution. In 1983 Wisconsin revised its original 1935 conservation education teacher training requirement into one which required preservice teacher training in environmental education. More specifically, this legislation required, as of July 1985, that all persons seeking certification in science, agriculture, social studies, early childhood, health and elementary education achieve specific competencies in environmental education prior to their certification.

To ensure that environmental education would be properly incorporated into the curricula of every district, a mandate was also passed in 1988 which required the development of a K-12 environmental education curriculum plan for each school district. These plans would outline the environmental objectives targeted for infusion into specific content areas and grade levels for each district. School districts must complete such a plan no later than 1991, at which time random audits will take place, with financial penalties for non-compliance.

Resources Available to Address the Mandate

To aid districts and teachers in the development and implementation of such a plan, the Department of Public Instruction (DPI) appointed an Environmental Education Curriculum Development Task Force in 1983 to develop "A Guide to Curriculum Planning in Environmental Education." This guide was completed in 1985 and a revised edition will be available sometime in 1989.

Besides the development of the guide, the Department of Public Instruction also provides a Supervisor of environmental education to serve as a resource person to aid school districts in the plan development and implementation process. These two resources, the curriculum planning guide and resource specialist, are the only formally funded resources made available by the state to help districts address the mandate. Currently there are 481 school districts in Wisconsin, encompassing 2,002 schools. These schools are staffed by 47,721 teachers of which 2/3 could be directly involved in the implementation process of their district's Environmental Education plan. These numbers suggest there exists a tremendous shortage of resources to assist with the development of environmental education district plans and related teacher training.

In an effort to assist school districts in the EE plan development process, the DPI has chosen six school districts in the state which will serve as models for the development, implementation and evaluation of a K-12 environmental education curriculum. DPI environmental education consultant, David Engleson is working directly with each district EE curriculum committee to help them develop and implement their curriculum plan. In 1990, the DPI will publish a report on each district's plan-development process, which will serve as a guide for compliance by other districts.

Other Wisconsin organizations such as the Department of Natural Resources (DNR), Cooperative Education Service Agencies (CESA), The Wisconsin Association for Environmental Education (WAEE) and some universities within the state have offered assistance in implementing the mandate for district plans. None of these organizations (except the University of Wisconsin - Stevens Point) have formal goals or funding targeted for these efforts.

Besides a serious lack of professional resources at the state level, no prototype of a comprehensive K-12 environmental education plan has been made available in Wisconsin to help districts develop their own program objectives. In light of these shortcomings, is it realistic to expect district curriculum committees to develop plans without further guidance? For example, scope and sequence plans for specific objectives relating to each of the five goals of environmental education (awareness, knowledge, values,

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skills and participation) could be developed to assist districts in their planning efforts. **Despite the DPI efforts to provide curriculum models by 1990, many districts are already developing their EE plans in efforts to meet the 1991 deadline.**

Teacher Training Efforts

After developing a well-structured environmental education plan, the successful implementation of such a program ultimately depends on teacher support and expertise. There is a growing recognition by many administrators and teachers that some type of environmental education program is needed to address the escalating environmental problems we are facing. In 1979, Champeau, Wilke and Gross (1980), surveyed a sample of central Wisconsin teachers on their understanding, use and support of the "Goals for Curriculum Development in Environmental Education." Ninety-three percent of the teachers surveyed felt that the achievement of environmental literacy should be a significant component of every student's education. However, these same teachers felt they do not have the training nor instructional resources needed to accomplish these goals.

The primary effort in teacher training within Wisconsin has been at the **preservice** level. Most preservice teachers receive training through their university teacher training programs. These efforts according to Champeau (1989) are generally doing well in providing teachers with the foundations of environmental education and the teaching strategies associated with it.

At the **inservice** level, most teacher training efforts in Wisconsin have focused primarily on environmental education curricular materials dissemination. Examples of these statewide efforts include the Project WILD, Project Learning Tree and Aquatic WILD workshops which focus on familiarizing teachers with curriculum resources available for the infusion of environmental topics into their classroom. Twelve thousand teachers in Wisconsin have attended workshops and been trained in using these curriculum resource materials. Though materials are provided to assist teachers in the infusion process, these 6-8 hour workshops do not include sufficient time to provide a firm foundation in environmental education and its associated teaching strategies. In addition, these training efforts depend largely on volunteerism and interest on the part of both the facilitator and teacher. Consequently, participants involved in these project workshops represent only a small portion of the inservice teachers who could actually be involved in the infusion process.

Another important factor needing consideration in teacher training efforts is that environmental education demands the learning of skills which today's teachers seldom employ in their classrooms. Environmental education involves students in citizen action - but public school administrators and teachers are very wary of this. Teachers find themselves severely challenged by this sort of teaching. Environmental education is also issue-oriented. Discussion of issues, values and alternatives requires a teaching style that is contrary to the dominant tone many teachers maintain in their classrooms. To expect teachers to try new educational approaches is to challenge them. There is a tremendous impact on teacher attitudes toward change if it implies departure from standard or traditional practices (McClaren 1987).

Development of an Environmental Education Ad Hoc Faculty Program

There is an increasing recognition by the Wisconsin Department of Natural Resources, Wisconsin Department of Public Instruction and faculty from the University of Wisconsin - Stevens Point, that a new educational approach is needed to bridge the gap between the current inservice teacher training efforts in Wisconsin and the perceived need.

In response to this need, the University of Wisconsin - Stevens Point (UW-SP) College of Natural Resources has proposed an ad hoc faculty program to provide teacher training services. This program will be described in more detail in another conference paper entitled "Master Plan for the Development of an Environmental Education Ad Hoc Faculty Program." For the purpose of this paper, the key points of the ad hoc faculty program are outlined.

The proposed ad hoc faculty program will consist of a network of 12-15 individuals who have teaching experience and a graduate degree in environmental education. The ad hoc faculty will consist of teachers, naturalists and others who will deliver inservice training in environmental education throughout the state. A series of five one-credit courses will be designed by UW-SP faculty with input from the ad hoc faculty. The ad hoc faculty will, in turn, teach these courses to teachers throughout the schools. One component of this series currently being developed by one of the authors is a self-instructional guide for the DPI's A Guide to Curriculum Planning in Environmental Education.

Besides the development and delivery of the teacher inservice courses, UW-SP is also developing an extended master's degree program in environmental education for teachers. This program will target teachers who want more in-depth training so they can serve as specialists and leaders in implementing EE programs.

Conclusion

Much progress has been made in the last four years towards achieving the goals of Wisconsin's environmental education mandates. Wisconsin's environmental education community, however, recognizes that no matter how well developed and comprehensive a district's environmental education plan looks on paper, it's the actual classroom implementation that ultimately will determine the EE program's success. According to Paul Hart (1987), the lack of teacher training and decision-making has resulted in a dismal record of past attempts to stimulate change towards our environment. To help ensure that Wisconsin's efforts in environmental education will succeed a number of steps are being taken. These steps include the revision of the DPI A Guide to Curriculum Planning in Environmental Education, the development of an ad hoc faculty program for teacher training, and the development of a new master's degree program for teachers in environmental education.

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1 + 1 = 3

Developing a Support Base for Environmental Education Programs

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Abstract

Collaborating with agencies having mutual educational needs but outside the environmental field can greatly increase the benefits of cooperative ventures. Four such collaborative strategies used by an elementary EE program for need assessments, infusion, evaluation and marketing will be presented with procedures for development and implementation discussed.

Description of Program

The Chicago Botanic Garden is a 300 acre outdoor museum located in the northern suburbs of Chicago. In 1987, the Environmental Education Awareness Program (EEAP) was developed to reinforce and promote the Garden's increased dedication to conservation education.

EEAP is designed to reach students at the intermediate level, grades 4, 5, and 6 and focuses on the ecology of woodlands, prairies and wetlands, plant communities native to Illinois. The program stresses the change, interaction and interdependence that occurs among living and nonliving parts of the environment. Through seasonal classroom and field studies in each natural community, students investigate the intricacies of energy flow, natural cycles, biological and physical components of the environment, diversity of plant and animal life, and adaptations of plants and animals. Through EEAP in-service training sessions, teachers are given the background they need to incorporate experiential environmental learning into the curriculum.

Development of a Support Base

Although the Chicago Botanic Garden realized the need for a comprehensive EE program in the suburban schools, did the schools feel the same way? If so, what would be the best way to introduce yet another topic in an already crowded curriculum? How do we get schools to participate and how might the developed program be evaluated to determine if it is meeting its goals? The Chicago Botanic Garden decided to ask the "outside" community for input - to involve potential user groups with mutual educational needs but outside the environmental field. This necessitated **collaboration.**

Need Assessments

A committee was formed to advertise the Chicago Botanic Garden education staff regarding the need for environmental education materials.

The Advisory Committee consisted of the Director of the Illinois Department of Conservation, the Science Consultant for the State Board of Education, the Superintendent of Conservation and two naturalists for the Cook County Forest Preserve District, the Science Consultants for two county Education Service Centers, two Science Curriculum coordinators for local school districts, a principal and three teachers already using the program, a representative from the Nature Conservancy, an educator from a Chicago museum on ecology, a representative from the Environmental Education Association of Illinois and Chicago Botanic Garden education department staff.

All potential participants were telephoned to invite their participation and to explain their role and our expectations. Background materials and sample lesson plans were sent to all participants in advance of a one-time meeting held at the Garden.

Staff felt that it was paramount to be realistic about the amount of time the committee members had to devote to the process and to be cognizant of the contribution they and their sponsoring agencies were making. As a result, all attempts were made to keep communications, meetings, and calls concise, priorities delineated and agendas on target. Those members unable to attend the meeting relayed their recommendations by phone or mail. Having everyone in attendance was not a priority. Instead the goal was to increase awareness of the program and getting their reaction.

All concurred from the beginning that EEAP was needed in Illinois and could be used by all agencies represented. Since this became a given, we were then able to seek committee advise on utilization. And what was evolving was that the very people who determined their need for the program became the agents for its utilization. They were buying into EEAP's future as collaborators on the project.

Infusion

From the onset, the Illinois State Board of Education goals for learning in biological science were integrated with the curricular development of EEAP. In addition, advice was sought and information gathered on the most frequently used science curricula in the local schools. These outlines provided the decisions for the curricular sequence and determined the conceptual themes stressed by grade level. Collaborating with a local school district to pilot the program for two years during its developmental phase, allowed for testing of materials and advice on procedures, logistics and content to help insure perpetuation and use. For participating as a "test case," the district received the material. Districts could also work with the coordinator for teacher training and student field work at a nominal fee.

The district became our support base as we involved other schools. Interestingly, as the committee made the following recommendations about infusion, they also became active in the process:

1) To increase the program effectiveness and dissemination, it is recommended that the Chicago Botanic Garden collaborate with local forest preserve districts, educational service centers and environmental education groups.

2) The importance of comprehensive teacher training in environmental science is a top priority. It may be possible to provide intensive training to selected education professionals within a school district, such as science consultants and specialists.

3) Expansion of the program to link with Science-Technology-Society issues is recommended, keeping in mind appropriate activities for students in grades 4 through 6 (state goal for learning, State Board of Education).

Marketing

Based on the aforementioned suggestions of the Advisory Committee and using the pilot district as a validation for the program's success, two courses of action for involving new schools and districts evolved. The first was to ask for help from the committee members who were willing, fully realizing that there needed to be something in it for them, some reason to take the next step. One member wrote an article on EEAP for a statewide environmental education newsletter. Another set up a meeting of district science coordinators at which Chicago Botanic Garden staff presented the program and discussed potential use. Another provided the coordinator with the opportunity to present two sessions at a county-wide teacher in-service highlighting the activities of EEAP for teachers. From superintendent to science curriculum coordinator to teachers, the word about the program is being disseminated and with the endorsement of the collaborating agency! And this, we know, makes all the difference. It is not the Chicago Botanic Garden saying EEAP is good and needed, but it is a credible educational agency supporting and promoting our product.

Secondly, staff contacted local school superintendents to acquaint them with the program and ask if their district would like to participate in Phase II. The success of the pilot was used as a promotion and the district was happy to provide letters of support and endorsement upon request. Following the initial phone contact, a cover letter with sample curricular materials, goals, and outline were mailed to the superintendent and science coordinator. Two new districts to the program for 1989-90 were solicited in this way.

The current interest in the quality of science education and the need to comply with the state science goals has enhanced the success of the program. Always mentioning that our program supports those goals and that state and local educational agencies are aware of the program is an asset in "opening the door" to discussion.

A brochure on EEAP, press releases, parents' open house at the Chicago Botanic Garden, presentations at state and regional workshops are also rather standard, but effective, tools for public awareness.

Evaluation

The need to validate what EEAP is accomplishing with students and the need to cognitively and affectively measure if we were meeting our goals also became the source for another collaborative. In this case the agency became the University of Illinois at Campaign-Urbana where we were put in touch with a graduate student doing research in educational psychology. She and a local Ph.D. candidate in education at Northwestern University are advising staff on the development and analysis of instruments to measure student and teacher progress. Since we are looking for affective change and the pedagogical approach of EEAP is process education, this has proven to be quite a challenge! However, evaluation is the means used by schools to insure validity and credibility. Credibility was also enhanced by having consultants affiliated with very reputable universities help in the development of our evaluation tools.

Benefits and the Collaborative Process

Collaboratives have the potential to provide:

— fresh approaches
— innovative solutions
— network systems
— support bases
— seasoned advice

The accomplishment of a team, working together, can equal much more than the sum of the parts. 1 + 1 can equal 3 if the collaborative parts are put together carefully and support mutual needs.

To be effective, however, the collaborative process must be open. Advice must be used or synthesized in a way that acknowledges the ideas and help of others. Those seeking the collaboration must also be willing to reciprocate and share time and advice with those who have helped. Including others in the decision-making process is part of the price which needs to be paid for the help of others.

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Beyond the program goals, collaboratives provide those of us in EE with the opportunity to talk to the unconverted, to extend our message to the "uneducated" educators by putting them on our team.

A Growing But Shared Responsibility

Cece Forget
United States Environmental Protection Agency
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Abstract

The role of EPA is evolving. In the future, EPA will not only share its responsibility for environmental protection with the states, but also with individual citizens. As environmental problems become increasingly complex and global implications continue to surface, EPA's responsibility for environmental education will grow. EPA will provide information on degrees of risk while individuals will determine how much risk they are willing to tolerate and what trade-offs they will accept in order to share the responsibility for protecting and sustaining the planetary ecosystem.

The gravity of EPA's role for educating the public will increase as the necessity for an informed public becomes more critical. The future quality of life and sustenance of the planetary ECOSYSTEM is dependent upon informed, sound choices and decisions to support a self-sustaining environment.

Focus on Forests: An Interdisciplinary Approach to Environmental Learning

Susan Gesner, Education Co-ordinator, and Jonathon Williams
Ministry of Natural Resources
Toronto, Ontario, Canada

Abstract

This presentation will outline the planning, design and development of a forestry education package for use by teachers of grades 1-12. The originating government agency working with the government education organization and interest groups and associations has developed an interdisciplinary package which encourages student-centered learning at all levels.

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Graduate Training in Conservation and Sustainable Development

Dr. Susan K. Jacobson, Coordinator, and John G. Robinson
Program for Studies in Tropical Conservation, Department of Wildlife
Gainesville, Florida

Abstract

Integrated Approaches to Training in Conservation and Sustainable Development is a $2 million initiative to develop and enhance multidisciplinary graduate training that integrates development with conservation concerns at 36 participating universities. Problem-solving approaches and extra-university linkages are used.

The Development of a Cooperative Energy/Environment Educational Program

Robert M. Jones and Jon E. Steinbrink
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Abstract

During the past twelve years, the project has conducted thirty-six teacher institutes and eight energy/environment curriculum development seminars. An interdisciplinary curriculum (K-8) is currently being published and disseminated. All funding is from local resources.

Combining Research, Agency Cooperation and Natural Science Education in the Rockies, a Teton Science School Success Story

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Teton Science School
Kelly, Wyoming

Abstract

With 22 years of successful programming to its credit, Teton Science School is again launching a precedent-setting programming that puts students in direct contact with current, challenging land and resource management issues. TSS is uniquely located on the boundary between Grand Teton National Park and the Bridger-Teton National Forest, and is now in sobering proximity to a 5,450 acre burn from the famous summer of '88. TSS is offering field-oriented courses that make students part of research teams, collecting biophysical data on a long term baseline study, on fire recovery study plots, and in conjunction with both national park and *national forest. This session would describe some of these TSS courses in detail, and outline the relationships with government agencies that have evolved to facilitate them.*

The Wyoming Outdoor Council:
A Case Study in Educational Outreach

Dr. Donn Kesselheim, Director of Education, and William Futrell
Wyoming Outdoor Council
Lander, Wyoming

Abstract

I. Conservation Biology Project: A phased approach on an annual cycle, designed by a small consortium to address three target groups.
  A. Teachers are offered a week-long, summer workshop emphasizing field activities in this new discipline.
  B. School administrators at their annual conferences are given the case for supporting conservation education.
  C. Students are involved in local follow-up projects, supervised by workshop alumni, and defined in collaboration with the natural resource agencies.
II. ConServe Wyoming: A sustained effort — statewide, ultimately — to involve students in conservation projects developed with the local natural resource agencies, as an aspect of the national movement to promote volunteer community service.

Shoshone youngsters cleaning up an illegal dumping area near a U.S. Fish and Wildlife Service waterfowl breeding site on the Wind River Reservation; fourth graders in Cheyenne creating wildlife habitat outside their classroom window; a journalism teacher from Jackson transmitting educational broadcasts from Base Camp on Mt. Everest; selection of an environmental issue as the topic for statewide forensic competition — What do these events have in common? They were all catalyzed by an unusual conservation organization in Wyoming.

The Wyoming Outdoor Council was founded in Lander in 1967, with a commitment to preserve the essential character of this least populous of the 50 states — keeping Wyoming **Wyoming**, as they say — particularly with respect to its natural resources. Privately funded, it is not affiliated with a regional or national organization.

In over 21 years of public education and advocacy, the Outdoor Council has had a constructive impact on a broad spectrum of public policy decisions. It has successfully tackled **both** the **contemporary** environmental issues of air, land, and water pollution and the region's **historic** conservation issues, namely, preservation of wildlife habitat, management of public lands, and sustainable development. Both sets of issues have an integral relationship to the preservation of Wyoming's essential character.

At the Outdoor Council's 20th Anniversary Meeting in the fall of 1987, a panel of longstanding Wyoming conservationists met to comment on the lessons learned from WOC's 20 years of conservation battles. That panel produced one conclusion that has shaped WOC policy since then: Relying solely on **political** approaches will never really solve Wyoming's environmental problems. To achieve profound and lasting change in the way environmental problems are addressed, and to bring about greater harmony between Wyoming's people and the land, a way must be found to change Wyoming's values and attitudes. What is required, the panel said, is an **educational** strategy that will foster an environmental ethic among Wyoming's youth.

Since that meeting, WOC's Staff and Board have developed specific approaches for expanding Wyoming's conservation education programs. Adopting Aldo Leopold's definition of what constitutes ethical land-use, they are taking the position that an action affecting land is right "when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise." Such an attitude held by young people is the outcome sought from these outreach efforts. To move toward this goal, the WOC Staff has selected two approaches: the **short-term strategy** — reflected in the **Conservation Biology Project** — is to engage teachers and students (and, indirectly, school administrators) in intensive learning and field activity connected to a specific discipline within the broad spectrum of studies related to conservation. The **long-term strategy** — embodied in a project called **ConServe Wyoming** — is to promote involvement of students statewide in conservation work, such as habitat improvement or scientific data collection, as a form of volunteer community service. Both strategies are designed to teach an environmental ethic to the next generation — changing the way Wyoming's future citizens feel, think, act toward the land.

The probable disappearance of over half of existing species during the next 50 to 100 years represents a global threat of major proportions. The intent of the **Conservation Biology Project** is to respond to this crisis by informing teachers and, subsequently, students about the related complex of issues, while also involving them in remedial action. The project is designed not only to have an impact upon the attitudes of young people toward natural resources, but also to benefit this region's wildlife through concrete initiatives that support threatened and endangered animals.

In terms of content, the Conservation Biology Project focuses upon the relatively new discipline of Conservation Biology, treating in some depth concepts relating to the importance of bio-diversity, the dynamics of species extinction, and management of genetic resources. Such topics are explored and applied to animals and plants in the northern Rockies.

To be more specific, the Conservation Biology Project is designed to approach three target groups:

Phase I: **Teachers** are offered a week-long, summer workshop with academic credit from the University of Wyoming at the headquarters of Grand Teton National Park, **emphasizing field study and the development of individualized curriculum materials** related to Conservation Biology.

Phase II: **Educational administrators** are urged to support conservation education in their schools, using their annual professional conferences as an opportunity for carefully honed presentations.

Phase III: **Students**, with guidance from teachers who have completed the summer workshop, undertake follow-up projects during the school year within their own communities. These follow-up projects are planned **in consultation with the local natural resource agencies** (e.g., the U.S. Fish and Wildlife Service, the Wyoming Game and Fish Department, the Bureau of Land Management, the Soil Conservation District), in order to build upon the ongoing work and priorities of the agencies. Typically, they emphasize:

- application of the concepts of Conservation Biology learned in the summer workshop;
- teacher use of nearby natural resources;
- field study in preference to classroom discussion;
- doing over talking.

To implement the Conservation Biology Project, a small consortium of non-profit organizations has come together. The consortium includes the **Northern Rockies Conservation Cooperative,** directed by Dr. Tim Clark; the **Teton Science School,** where the director is Mr. Jack Shea; and the Wyoming Outdoor Council.

Currently, the consortium is closing out the first annual cycle in the Conservation Biology Project. The teacher workshop last August — which was designed and led by Tim Clark, a prominent figure in North American zoology — was very well received. It attracted 21 participants; of this number, about two-thirds elected to do a follow-up project. Teton Science School staff members, with help from WOC, are taking the initiative in conference presentations and newsletter articles aimed at public school administrators. The Outdoor Council is providing support for the student projects by making available: technical references; curriculum materials; a “bridge” to the local offices of the natural resource agencies; and on-site visits for direct consultation. **Planning is well under way for the second annual cycle.**

ConServe Wyoming was created to do two things:

a) To move forward on greatly needed conservation projects that will benefit Wyoming’s land and wildlife; and

b) To promote opportunities for volunteer service among the state’s young citizens.

The activities that the project fosters are much like those of the widely respected Youth Conservation Corps, but differ in one important respect. Students work, not as employees, but as **volunteers**, committing their time freely as an act of **responsible citizenship**. The project will give the next generation of youth a way to make a personal investment in their inheritance, so that it can be passed along to the following generation intact.

Through **ConServe Wyoming,** the Outdoor Council is working toward the following long-term **objectives**:

— **Students** in Wyoming’s public schools will voluntarily participate in important conservation projects. This is the Wyoming Outdoor Council’s contribution toward a statewide initiative aimed at involving **every** student in some form of community service which is both meaningful and sustained.

— **Communities** will be enriched by the voluntary service done by their student-citizens.

— **Natural resource agencies** in Wyoming will train and use students to enhance the quality of service each agency provides its constituency.

— **School authorities** in Wyoming will encourage and support students in community service as an essential part of public schooling.

To achieve these objectives, the project will pass through three phases:

Phase I:

a) A pilot program is being undertaken in one public school district, namely, Fremont County School District #1 in Lander.

b) To test receptivity to the concept, a statewide planning study is being carried out.

Phase II:

a) The initial pilot program will be advanced to a demonstration stage.

b) Two additional pilot programs will be initiated, probably on the Wind River Indian Reservation and in the nearby community of Riverton.

Phase III:

a) The project will shift to a statewide basis, aiming ultimately at participation by at least two-thirds of Wyoming's 49 school districts.

Currently, WOC is part-way through Phase I of ConServe Wyoming. The pilot program in Lander has developed strong momentum, as evidenced by the fact that a special course carrying academic credit has been introduced into the high school curriculum for students who have an ongoing involvement in volunteer activities. Lander led Wyoming by participating enthusiastically in a national observance of youth service in action during the month of October. Lander Valley High School sent the first group of volunteers to participate in an effort launched by Jane Sullivan, the Governor's wife, to beautify Wyoming's highway rest areas with plantings of indigenous wildflowers. Working with such local natural resource agencies as the Bureau of Land Management, the U.S. Soil Conservation Service, and the Wyoming Game and Fish Department, we have developed a varied and challenging **smorgasbord** of opportunities for young people to do significant work related to conservation. . . . Design work on a statewide survey is scheduled to begin shortly.

For a conservation organization, the mode of functioning which is reflected in the two projects described above is breaking new ground in Wyoming. Operating as a catalytic agent is a far cry from monkey-wrenching.

Getting Your Agency's EE Materials Used in the Public Schools

Frank Knight, Environmental Educator
New York State Department of Environmental Education
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Abstract

By working closely with state and local educators, EE materials can be developed, tested, evaluated, and revised to become welcomed curriculum fulfillers rather than shelved add ons. Share and compare, swap experi-

ences and handouts with a Department of Environmental Conservation educator from New York, a state with fixed syllabus-directed curricula.

All too often, environmental education organizations develop educational materials for a targeted school audience, mail them out and hope they get used.

In New York State, the Department of Environmental Conservation's (DEC) Bureau of Environmental Education has attempted several schemes to ensure that materials will be used in school classrooms.

New York's State Education Department (SED) produces a syllabus which mandates what topics will be taught at each grade level. Local school districts then flesh out this syllabus into specific, detailed curricula. Knowing the "game plan" for the entire state is most helpful in generating supplemental educational materials. For example, if I wanted to generate materials relating to local history, the social studies syllabus would tell me that local history is taught in the fourth grade.

If I wanted to develop materials that would be used by teachers working at several grade levels, I include in my introduction where and how these materials relate to the syllabus. Recently we produced two wildlife posters - each with a teacher's guide. The introduction referenced exactly where in the syllabus by grade level and page, and what topics these posters would relate to. In addition, a list of topic areas (e.g., adaptations, migration, succession) and skill areas (e.g., classification generalization, reading) was included that posters dealt with. Included in the state syllabus is a detailed chart showing which mandated inquiry skills, language arts skills, science attitudes and physical science and life science topics are addressed by each activity. This chart can easily be copied, adapted to any instructional program and is often included with supplemental educational materials.

Although relating environmental education materials to the syllabus doesn't guarantee their use, it certainly enhances their credibility. The teacher knows that the materials' author is familiar with the syllabus and has attempted to relate to it in helping the teachers.

Another real help in getting materials used is establishing and maintaining a good relationship with SED personnel. We work closely with the SED coordinator of environmental education. We ask his advice in planning new programs and submit copy for his review. He helps us with very practical needs like how to get a statewide set of mailing labels to be able to send materials to teachers of a specific course. He helped us design a brief evaluation form for materials on water quality that were sent to elementary schools. This feedback device proved that the materials were used and gave a sampling of teacher reaction. Wherever possible, we keep our relationship reciprocal. When SED was about to prepare some instructional modules on water and solid wastes, we shared with them our files on these subjects and introduced them to professionals working in these program areas.

Certainly one of the most interesting and potentially far reaching of our cooperative endeavors with SED relates to the New York State Science Technology and Society Education Project. In this project funded by the SED, the state university system, the state power pool, and a grant from the National Science Foundation, curricular materials are generated and disseminated to middle level schools. Thus far, we have provided information and advice on producing solid waste materials. A variety of additional environmental topics are being planned with the goal of changing the way science is taught in New York. These new methodologies will be consistent with the school reform initiate, Project 2061, of the American Association for the advancement of Science (AAAS).

Certainly, this latter type of cooperative effort has the greatest potential for success. SED generated materials are more likely to be used than materials produced outside the SED system. DEC's role here is to provide SED writers with state environmental law and policy and to check materials for technical accuracy. Since these materials are written by classroom teachers, field tested and reviewed by teachers, they are most likely to fulfill teacher needs.

Outdoor Classroom Workshop
San Luis Valley, Colorado

Ronald L. Miller
Soil Concervation Service
Center, Colorado

Abstract

This environmental course, an extension class of Adams State College, is for teachers in Colorado and New Mexico. Wetland and upland values are discussed with professionals from the college and five cooperating natural resources agencies.

Cooperation is the reason the Outdoor Classroom Workshop has been a success. Cooperation between instructors at Adams State College of Alamosa, Colorado, and field representatives from numerous federal and state natural resource agencies has been the key that has opened a new door to environmental education opportunities.

This cooperation led to the formation of the San Luis Valley Outdoor Education Association. The association was formed as a central catalyst for local education purposes such as sponsoring a fall college extension course known as the Outdoor Classroom Workshop.

The idea to establish a local environmental education group was developed in 1986 by Ed Merritt, a biologist for the U.S. Fish and Wildlife Service. He reasoned that the San Luis Valley with its unique aesthetic opportunities at the Alamosa Wildlife Refuge and the Great Sand Dunes National Monument would create a beautiful backdrop for education activities.

Additionally, there was a largely untapped resource in personnel from the many environmental agencies that are active in the valley; personnel that are interested in conserving the natural resources for the enjoyment of all people. Individual representatives of the U.S. Fish and Wildlife Service, U.S. Forest Service, Colorado State Forest Service, Soil Conservation Service, National Park Service, the Colorado Division of Wildlife, and Adams State College along with interested local educators comprise the current membership of the Association.

The Outdoor Classroom Workshop is open to teachers at any grade level. This workshop is a one credit extension class with Hobart "Hobie" Dixon as the instructor of record. He is assisted by the other members of the association as discussion leaders. The environmental awareness programs presented by this group results in an unequaled learning experience.

The workshop is offered on a weekend in the fall of the year, hopefully during the Indian summer that is so common to the San Luis Valley. Stunning color contrasts at that time of the year set a mood that inspires environmental awareness. Ninety percent of the workshop activities occur outside of the confining walls of a classroom; nature establishes the confines of the workshop topics.

The workshop addresses two major plant communities of great importance to our future: wetlands and upland forests. On Saturday the values and continued importance of wetlands is evaluated. Some indoor activities are associated with this session, but these are kept to a minimum to allow the maximum time for field exploration. All field activities occur at the Alamosa Wildlife Refuge located southeast of Alamosa. These activities have included bird watching exercises, an introduction to Project WILD, and marsh walks with animal and plant investigations. The emphasis is toward hands-on participation in activities that can be adapted to any local wetland from the smallest puddle to the great rivers. Many of the ideas may be adapted to uses far removed from the wetland habitat.

On Saturday evening a family function is planned. The evening activities begin with a barbecue at the Great Sand Dunes National Monument. If we are lucky enough, a local mountain man will stop to dine with the group. A good meal and free coffee will usually loosen his tongue and will result in a very entertaining evening for all ages. The National Park Service has offered free camping for this weekend to anyone that wishes to stay at the Sand Dunes.

All Sunday activities occur at the Sand Dunes. The group participates in Project Learning Tree, sensory awareness walks, and the study of upland sites, including plant and animal life, geology, history, archaeology, and erosion. Hobie Dixon excels as the discussion leader for the upland habitat. The use of all senses to experience the wonders of nature are stressed on this day. By three in the afternoon, the participants are released to return home and prepare for Monday classes.

The workshop has been offered as a one credit course for fifteen hours of instruction. Credit is earned by attending all sessions and completing an original lesson plan orientated toward environmental education. Active teachers must try this lesson plan with their class and report the results to the association by December 1. Since the class is limited to 30 participants, early registration is always strongly advised.

The goal of the education association is to offer a stress-free, relaxed weekend interacting with nature. Every year's session has been a fun weekend for all, whether participants or discussion leaders. There may be physical stress for some people that are not accustomed to the altitude or mountainous terrain. Not to worry though, discussion leaders are available to assist with lighter activities should the need arise.

The association also cooperates to offer discussion leaders for field trips and classroom settings within the area. Although the Sand Dunes and the Wildlife Refuge are ideal sites for environmental education, many locations have been used to teach the same concepts. The various resource specialities of the association members have made this possible.

For more information, contact Ronald L. Miller, Soil Conservation Service, P.O. Box 428, Center, CO 81125, (719) 754-3402.

Proactive Planning for Environmental Curriculum Change

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and
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Education Services Branch, Alberta Forests, Lands and Wildlife
Edmonton, Alberta, Canada

Abstract

The cooperative development of a new Alberta Environmental and Outdoor Education curriculum provides a comparison of efforts of two agencies involved - the Alberta Teachers' Association specialist council (EDEC) and Alberta Lands, Forests and Wildlife (Producer of the Alberta Conservation Education Program).

One Planet From Two Perspectives

NASA-NPS Steering Committee
Mill Valley, California

Abstract

As we approach the 21st Century, two government agencies with seemingly disparate mandates are forging a partnership that will heighten our understanding and broaden our knowledge of the Earth's ecosystems. It will also strengthen our stewardship of Earth's limited resources. Through cooperative research and educational programs, the National Park Service and NASA together are providing different perspectives of the Earth, while both are committed to studying and communicating global issues affecting the future of the planet.

The two agencies along with support from interested organizations and universities, formed a steering committee to develop new ways of sharing research, staff and ideas. As a result, three specific goals have been set: 1) To organize a national workshop to formulate collaborative goals and projects, and to formalize the interagency agreement, 2) To identify and implement specific joint research projects, and 3) To develop interpretive/ educational programs to foster public understanding of global issues.

The overall goals are much broader. The idea is to set an example of national interagency and private sector cooperation in both environmental education and research. Then, by example, encourage other environmental, scientific, research and educational agencies to cooperate, share and network in integrated Earth Science research programs and public education addressing global issues.

If, as environmental educators and interpreters, we can begin opening up channels of communication between our agencies and organizations, we

can begin sharing resources, staff, ideas and materials to begin addressing the issues affecting our planet.

Cease Fire on the Prairie - How Adversaries Became Partners in a Water Education Program

Dennis L. Nelson
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North Dakota State Water Commission
Bismarck, North Dakota

Abstract

This state sponsored and developed water education program is for resource educators and K-12 teachers. Environmental and water management and development groups worked together to develop this unique and successful program.

It might seem odd to relate the merging of the North Dakota State Water Commission's Water Education for Teachers (WET) program with the North Dakota Game and Fish Department's Project WILD Aquatic to a cease fire situation; however, considering these two agencies sometimes find themselves at loggerheads over certain water management issues, this analogy is fitting.

The results of the merger are positive. A cooperative spirit has evolved where little prior cooperation existed. This has opened up new channels of communication between water managers, wildlife managers, and the general public. The merger also resulted in the shared use of people and financial resources which meant cost savings for both programs.

Mention the word "WET" to a teacher five years ago and the only response you might have seen was a blank look on his or her face. Today, however, "WET" has a special meaning to thousands of North Dakota teachers.

In 1984, both the State Water Commission and the Game and Fish Department were looking for ways to get water education materials into the hands of teachers. The State Water Commission was developing its WET program and the Game and Fish Department was in the process of implementing the aquatic portion of Project WILD.

Although both programs were designed independently, it became fairly obvious that the two agencies were targeting the same group - educators. As a result, the WET and WILD/Aquatic programs are conducted as part of a single workshop.

The State Water Commission's WET program is broad in scope, addressing a variety of water-related topics (i.e., groundwater, water pollution, surface water, water use, water history, water management, and contemporary water issues). Project WILD/Aquatic focuses primarily on North Dakota's aquatic resources and water management as it relates to wildlife. Both programs stress teaching students "how to think, not what to think." This basic educational philosophy is strictly adhered to during workshops and in the development of written materials.

The WET program is different from most natural resource programs in that it portrays development in a positive manner. Many natural resource education programs have a reverse emphasis—portraying the use and development of natural resources as inherently destructive. These programs do not fully recognize the value and positive aspects of development to society. When combined, the WET and WILD/Aquatic materials represent a holistic approach to natural resource education.

The idea of combining the programs was encouraged by agency administrators. "The State Water Commission could have easily offered the WET program to teachers in a separate workshop, and, in the process, avoided administrative and coordination hassles. This didn't make much sense, though, considering both agencies were targeting teachers," says Vern Fahy, State Engineer.

"The water development community and wildlife interests have different opinions on how the state's water resources should or should not be managed. This is normal and should not be a roadblock to joint efforts. It is healthy for the teachers attending workshops to learn about both sides of the issues," states Mike Dwyer, Executive Director of the North Dakota Water Users Association and one of the WET program's most vocal supporters. This type of open-minded thinking is the foundation of both programs.

The WET program and Project WILD/Aquatic have separate materials and operate independently in project development and coordination. For example, a high priority of the Game and Fish Department is to educate people about North Dakota's fishery and fish management. This topic is addressed at workshops through speakers and activities. The State Water Commission has several unique and innovative teaching aides that it relies on to cover priority topics. Workshop leaders use the Groundwater Flow Model to address groundwater topics; the Water Resources Management Simulator, an interactive computer, is used to discuss watershed manage-

ment concepts and issues; and the Liquid Treasure: Water Resources in North Dakota (suitcase exhibit) is used to discuss water history topics (i.e., ice harvesting, fire fighting, water witching, water hauling, etc.).

The resources of both programs, when combined in a workshop, make an impressive educational package. In fact, most teachers who attend Project WET and WILD/Aquatic workshops are very impressed by the quality and quantity of materials provided. Bismarck elementary teacher Ann Hauer says, "I have acquired a new awareness of water resources and water management problems in North Dakota. I feel this education can benefit me as a citizen, and my students will also benefit when I share this information with them." Comments of this nature are common from workshop participants.

North Dakota educators have had plenty of chances to attend workshops. Over 2,000 educators have attended more than 50 workshops since 1984. These educators have the potential to reach over 40,000 young people with this information. These young people will someday have an opportunity to use what they have learned about North Dakota's water and aquatic resources to make important management and development decisions.

Taming the "Vicious Circle"

Martin Ogle, Chief Naturalist
Potomac Overlook Regional Park
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Abstract

This paper outlines the initial stages of a unique partnership that has been formed between a nature center, a social-work agency, and a church to create a unified front in the solution of environmental, social and religious problems. The philosophy behind the partnership, organizational logistics, and types of activities and projects undertaken will be discussed. This paper is a project prompted by a 1988 NAEE paper entitled "Environmental and Social Problems - a Vicious Circle?"

A "vicious circle" is defined as "a chain of events in which the solution of one difficulty creates a new problem involving increased difficulty." At the 1988 NAEE Conference, I presented a paper entitled "Environmental and Social Problems - a Vicious Circle?" which suggests that our modern tendency to deal independently with various environmental and social problems **actually makes things worse** (Ogle 1988). Despite the hard work of dedicated and able people in environmental, social, and religious fields, many of today's problems fester and worsen. In the present paper, I outline

an initial attempt to "tame the vicious circle" ...to deliberately integrate the environmental, social, and religious concerns of our day.

It must be stressed that this paper does **not** prescribe any one course of action. Rather, it offers an example. The only specific prescription set forth is that whatever actions are undertaken, they should be done with the realization of and commitment to the interrelatedness of **all** aspects of life. The concept of interrelatedness is, of course, not a new one nor is it specific to one discipline. To Barry Commoner (1974), interrelatedness was the "first law of ecology" and he used it to comment on modern social problems; Martin Luther King felt that "Injustice anywhere is a threat to justice anywhere. We are caught in an inescapable network of mutuality tied in a single garment of destiny;" and Chief Seattle, in his 1854 "lament" to the U.S. president, said "All things are connected like the blood that unites one family." However, despite the general concensus that interrelatedness is a valuable concept, actions to back it up are rare in modern society.

To act conscientiously and realistically on the assumption of interrelatedness requires the rejection of "tunnel-vision" concepts such as cost-benefits ratios, consumerism, and economic indicators as the **primary** criteria of feasibility and desirability of our efforts. The limited view of "economics" must be extended to "socio-ecological economics" when making decisions about how we order our lives. More research, talk, and prose on this idea, however, do very little good unless they are put into practice. Following is a step-by-step account of how we laid the groundwork and implemented an integrated effort by our nature center, a social-work agency, and a church.

1. Reestablishing Communication

Vicious circles are caused and maintained by a breakdown in communication. Many modern problems (pollution, drug abuse, habitat degradation, poverty, etc.) form a vicious circle that was initiated and is perpetuated by a breakdown in communication between the social, environmental, and religious fields (Ogle 1988). Therefore, the first action necessary is to reestablish communication between groups.

Most of us have some direct or indirect contact with social, environmental, and religious institutions. The groups I had most contact with were the Arlington/Alexandria Coalition for the Homeless (AACH), Mount Olivet United Methodist Church, and Potomac Overlook Regional Park and Nature Center (my workplace). The first task was getting people in these three northern Virginia institutions talking about how their concerns were interrelated, and in many ways, one and the same. To do this, I arranged meetings, had personal conversations, and presented my 1988 NAEE paper to people from AACH and Mount Olivet. By sharing the problems and concerns of each group, common root causes emerged: for instance, how materialism leads to pollution, drug abuse, and religious apathy which in turn drive the wheels of materialism even faster.

Prior involvement with the three groups made communication easier, but was not necessarily a prerequisite. In most cases, people and groups **want and need** to interact and will do so if pathways are provided. In the present case, each group gave "official" support for participation in this unified effort.

2. Selecting a Symbol

A symbol or logo can be far more effective than any amount of writing or talk in focusing attention and communicating ideas. We felt this to be especially true in the cooperative effort we were initiating. Our logo symbolizes the unity of social, environmental, and religious (or philosophical) aspects of life (figure 1).

3. Finding Common Denominators

In what ways do social, environmental, and religious concerns overlap? Although the complete answer to this question is "in all ways," **it is helpful to identify and openly discuss** some specific common denominators.

A. People.

People are at the core of social, environmental, and religious questions. The mere fact that people pose the questions in the first place illustrates this. Problems that sociologists, ecologists, and religious leaders grapple with would not exist on a planet without conscious beings such as people. This may seem obvious, but it is often forgotten as the common ground upon which to view our situation.

B. The need and urge to interact at all levels.

As social beings, people have a need to urge to interact with each other. These urges hold families, communities, and even nations together, ensuring individual survival. Both science and personal feelings reveal total interdependence between living and "nonliving" components of our planet (including people). Religion is founded upon interaction between people and their inner beings and/or higher being(s). Such interactions motivate, drive, and even embody life. Michael Cohen (1983 and 1987) suggests that these "affinities" give the world stability, have created a self-organized global system, and are responsible for the sustenance and regeneration of life. Therefore, we should not only work to nurture people's interactions at all levels, but should also be vigilant against tendencies to split and fragment life.

C. Consumptiveness.

The single dominant aspect of modern society underlying social, environmental, and religious problems is our excessive levels of and preoccupation with consumption of materials and energy. At the social level, consumptiveness leads to misplaced energies and values, and to obvious inequities. Many of the "haves" suffer unfulfillment, depression, and psychiatric problems due to their compulsions, and are often just at bay from the foaming jaws of the "have-nots." The "have-nots" are paralyzed by the urge to attain societal norms of "success," and often suffer the shortages of inequity. Both groups vent their frustration in ways ranging from violence to drug abuse to military buildup.

Consumptiveness is also the primary root cause of environmental problems. The present unsustainable levels of habitat destruction, pollution, and soil loss would not exist were it not for present levels of consumption which are far beyond survival (or even comfort) levels. While some argue that many environmental problems are due to sheer overpopulation, these are overshadowed on a global scale by the insatiable appetites of more "developed" countries with low density populations.

Finally, most world religions warn against the perils of preoccupation with worldly things. These warnings are based on both worldly and "heavenly" consequences of consumptiveness.

Neither a comfortable and challenging society or a growing economy depend on consumptiveness. Does this mean that to fix things we must live as paupers? By no means! Although a needed first step is to reduce our materialism, it does not mean we must do without anything. Just as important is that we place more emphasis on interrelationships (described earlier) that consumptiveness destroys.

4. Actions.

After establishing the above groundwork, it is possible to initiate actions to begin taming the vicious circle. The actions should result from constant interplay between groups and whenever possible should address social, environmental, and religious (or philosophical) concerns together. They should encourage interaction of people with **all aspects of life** and minimize consumptiveness (or work towards that end).

In general, our actions fall into three categories (table 1). The first category is existing actions that already address more than one concern, but which are enhanced by their inclusion into the three-way effort. For example, Mount Olivet's past monetary support of AACH has helped procure food, furniture, and household goods for people in transitional housing. Now, however, church members **share** in the work of moving donated goods that might otherwise be thrown out. In this way, they help others in need, reduce consumptiveness (the need to produce new goods), and can share both socially and spiritually with each other.

The second category includes short-term projects and programs designed not only for their own value, but also to be symbolic movements towards wholeness. The third, or "lifestyle category," includes actions that foster and embody long-term sharing, skills, and outlooks.

Three interns have been hired with small stipends shared by the involved institutions. The Potomac Overlook portion comes entirely from our aluminum recycling project. The interns will work at projects ranging from children's programs, to recycling, to designing a nature trail for Mount Olivet.

The cooperative effort described above is but a tiny beginning - both in terms of its own potential and of societal needs. However, we believe it is a start in the right direction and urge others to help celebrate and act on the interrelatedness of life. Solutions to the wide realm of global problems can be realized when a "critical mass" of people find that interrelating with life is more fulfilling and challenging than singleminded consumptiveness.

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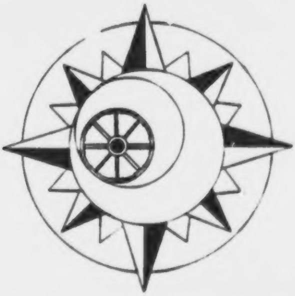
Figure 1. A symbol of the interrelatedness of social, environmental, and religious (or philosophical) aspects of life.



The inner wheel symbolizes human history and present-day actions. It is shown as a subset of planet Earth (larger circle) and of the sun. The largest, broken circle represents total knowledge, or reality, which is always incomplete for human beings. This logo might also be a symbol of wisdom as it illustrates that we know what we know (the interrelatedness of life), and that we do not know what we do not know (the final answers on where we came from and where we are going).

Table 1. Examples of interrelated actions between Arlington/Alexandria Coalition for the Homeless (AACH), Mount Olivet United Methodist Church (church), and Potomac Overlook Regional Park (park).

Category 1 - Existing actions enhanced by inclusion in cooperative effort.
A. Church volunteers move furniture, distribute food, etc. for AACH.
B. Aluminum recycling programs at church and park.
C. Environmental education programs by park staff for church groups.
D. Groups at church study environmental and social issues.
E. Church dinners (occasionally include AACH, and have discussions on origins and environmental costs of foods served).

Category 2 - Short-term projects and programs.
A. Easter egg hike for church and AACH children at park (emphasized sharing and new life).
B. Cooperation and participation in park open house activities.
C. Afternoon of sharing games and recreation that are non-consumptive.
D. Outdoor church services and Sunday school classes.
E. Church/AACH picnics at park with environmental education activities.
F. Environmental education program at church as fundraiser for AACH.
G. Field trips for people from AACH and church to local regional parks.

Category 3 - Long-term lifestyle activities.

A. Cooperative gardening project: people from church and AACH work and learn at park garden plot, and produce is donated to AACH or used for special dinners.

B. Form carpools/walking groups to workplace/church to save energy, promote interaction and discussion, promote health, etc.

C. Recycling - not only recycling cans, bottles, and newspapers, but learning how our actions influence recycling of land, air, water, and life in general.

D. Concern series at park and church as social events and fundraisers (for AACH and environmental education materials for park).

E. Workshops and consultation on energy conservation, lifestyle simplification, etc.

F. Spanish/English classes and programs at church and park to help serve and interact with Hispanic cliental at AACH and local Hispanic community.

G. Big brother/sister and adopt-a-family programs with activities at church and park.

H. Workshops and consultation on career options that bring work and stewardship together as one.

A State Board of Education's Role in Environmental Education

Art Pansing
Colorado State Board of Education Member
Denver, Colorado

Abstract

In 1988 this State Board of Education charged one of their members with the task of developing a statewide plan for environmental education K-12. Results of this initiative will be discussed.

Colorado's Teacher's Workshop Makes Conservation Tangible

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Abstract

In its eighth year with scenic Western State college, Gunnison, this cooperative effort among state, federal, local and non-profit agencies offers the challenge and thrill of hands-on learning and two graduate credits. Of the statewide attendees, 65-70% have been elementary educators.

"Rangeland...Its Many Uses" was the theme for the eighth annual Conservation Teacher's Workshop, July 10-12, 1989 at Western State College (WSC) in Gunnison, Colorado. The workshop setting of warm summer days and the cool nights of this rural, scenic area manages to remove most participants from the distractions inherent in being "close to home."

The workshop is coordinated by the Colorado Association of Soil Conservation Districts (CASCD) and Dr. Don Ihrke of WSC. It involves a long-term cooperative effort among federal, state and local agencies and CASCD, a tax-exempt, nonprofit organization. Registration fees for the workshop include two graduate credit hours from WSC. According to new policy by the State Board of Education, effective July 1, 1989, workshop participants will also be eligible for inservice credit and will receive a certificate for this achievement.

Fees for the three day hands-on opportunity have not varied widely since the workshop's inception. Those fees have been kept to a minimum because the steering committee continues to choose resource people who do not charge for their services. "Hired" speakers from Colorado and neighboring states are offered a small expense reimbursement for their contribution to the program. Western State College handles arrangements for the graduate credit, some field trip transportation and dormitory rooms for interested attendees. CASCD is the financial agent for the workshop.

A cap of 70 participants has been set to maintain the personal learning experience and assure a continued pool of attendees in following years. Since its inception, the workshop has never failed to sell out and produce a waiting list. Historically, about 70% of attendees have been elementary educators, with the balance being secondary educators and occasional administrators.

All segments of the workshop, including two organized meals, are considered part of the necessary number of contact hours required for the graduate credit. The subject/theme of the workshop is changed each year to assure continued credit to former participants. Some of the more recent subjects have involved forests, water quality and soil erosion.

In completing the graduate credit requirements, participants are required to prepare a lesson plan for teaching a conservation unit or a plan for integrating conservation into the year's course of instruction. Attendees are encouraged to bring the necessary reference materials from their school in order to complete this assignment. The workshop is self-contained. All the work required for the two graduate credit hours is completed by the close of the final day.

The first segment of the program involves agency representatives, landowners or business people speaking from experience, to give the participants a background on the subject. The field trip on the second day is developed by personnel from the USDA Soil Conservation Service, with assistance from the U.S. Forest Service and Bureau of Land Management. It is intended to provide hands-on examples of resource management coupled with tasks to develop a lasting impression. On the final day, an entire morning is dedicated to presentations by teachers with outstanding and/or award-winning programs. Most of the winners of Colorado's Deutz-Allis Conservation Teacher of the Year awards have been called upon over the past eight years to present their winning formula during this segment. This type of peer interaction has been effective in encouraging integration of a wider variety of conservation and environmental subjects into the attendee's course of instruction.

The workshop has received wide support in the conservation community and has steadily gained in popularity. Other states have requested information to develop a similar program. In terms of local support, the Gunnison Soil Conservation District has been a friend to the workshop over the years. The SCD received, in the early years of the workshop, a Deutz-Allis Conservation Education Award for District of the Year, in part for their efforts on behalf of developing the workshop. Each year the SCD supervisors organize a barbecue for participants after the day-long field trip. The district also offers scholarships to local participants.

Other local soil conservation districts offer full or partial scholarships to teachers who live or teach in the district and wish to attend the workshop. Scholarships are also provided by the Isaac Walton League, Colorado Federation of Garden Clubs, CASCD and some school districts. The SCD offices help publicize the workshop from January through May locally, while the State Departments of Agriculture and Education publicize it in their respective newsletters.

The history and success of soil conservation districts for about fifty years has depended upon cooperation with state, local and federal agencies. In these competitive, economically-trying times, all of us have begun to realize the importance of combining our efforts. It improves our effectiveness and our efficiency.

"Holistic" has become a buzz word today. The public is beginning to realize that everything on this planet is interrelated—every action can have global implications. People have become sympathetic to the holistic approach to conservation, and to agencies who cooperate in the treatment of and education about our natural resources. The "grass roots" manner of operation which characterizes soil conservation districts has contributed to the success of this long running Conservation Teacher's Workshop.

CASCD policy looks at the Conservation Teacher's Workshop as a vehicle to help do the job required of us in conservation. With teamwork that job will be a little easier. Cooperative efforts such as this workshop are the way to proceed into the 1990's.

Plan for Implementing a University of Wisconsin-Stevens Point Statewide Center in Environmental Education for Inservice Teacher Instruction and Outreach

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Abstract

In 1985 legislation was passed in Wisconsin requiring all school districts to develop, implement and evaluate K-12 environmental education curriculums by 1991. In addressing these mandates, school districts face several barriers. This presentation deals with what these barriers are and how they are being addressed.

Teachers and Environmental Education

Since teachers are extremely important in the implementation of environmental education, it seems logical to expect that they themselves must become environmentally literate, environmentally active citizens in order to effectively infuse EE into their curriculum and teach its skills and concepts to their students. This requires that they understand and possess the awareness, knowledge, attitude, skills and participation involved in becoming environmentally literate.

However, teachers appear to be deficient in environmental education teaching skills and the understanding of the concepts involved. The result of several studies indicate a real need for teacher training in EE (Champeau et. al., 1980; Hungerford and Peyton, 1980; Ham and Sewing, 1987).

Underlying all environmental concerns is a complex array of interconnected issues based in the natural and social sciences, i.e., ecology, economics, biology, politics, chemistry, psychology, land use planning, ethics, aesthetics and humanities. Few teachers, especially specialized secondary teachers, have the broad background needed to effectively implement a curriculum which deals with environmental issues from an integrated, multidisciplinary point of view (Gallagher, 1975). Hungerford and Peyton (1976) identified a knowledge of the principles of ecology and their significance to human interactions with their environment as vital components of the cognitive knowledge required for environmental literacy. Yet teachers have professed that their lack of knowledge of ecological concepts and interactions prevents their implementation of EE into their classrooms.

As identified in the previous paper, entitled "Four Years Into the Wisconsin Environmental Education Mandates," Wisconsin public school districts have been mandated to develop, implement and evaluate K-12 EE curriculums by 1991. Wisconsin's school districts and teachers are in need of assistance to meet the Department of Public Instruction and legislative requirements.

In addition, Wisconsin teachers can no longer receive life certification. New teachers must complete at least six credits every five years to maintain their license.

Many teachers rely on inservice training programs to update and expand their knowledge, obtain materials, share ideas, and earn course credits. Environmental education inservice program planners can capitalize on these dependencies by designing inservice programs which eliminate or reduce teachers' real and perceived deficiencies in EE. Teachers' participation in EE inservice courses can help them achieve the DPI and legislative mandates, while earning credits toward their licensing requirements.

Program

Wisconsin offers several opportunities for teacher inservice training in EE. Each year inservice teachers attend Department of Natural Resource offerings of Project WILD and Project Learning Tree workshops. Through publication of the "A-Z Brochure" the University of Wisconsin-Stevens Point (UWSP) provides coordination of statewide offerings of EE-related credit courses. The brochure attempts to list all Wisconsin offerings of EE credit courses for teachers.

However, there is a recognized need for a more comprehensive statewide approach to inservice teacher training in EE. To address this need, UWSP has allocated resources and personnel to the development of a statewide center for EE instruction and outreach. Working cooperatively with the Department of Public Instruction and Wisconsin Department of Natural Resources, the UWSP center will provide statewide leadership and coordination for inservice teacher training in EE. The goal of the UWSP center is to assist in reducing or eliminating barriers to effective teacher implementation of EE in the classroom by improving the environmental literacy and EE skills of Wisconsin teachers.

Implementation Plans and Procedure

As the first step in the planning and implementation of this program, a steering committee has been formed consisting of UWSP faculty and graduate students. Guiding the program planning process is an identified set of objectives:

1) Develop and market a series of one-credit teacher inservice courses in environmental education. By taking these courses teachers will:

a) Gain hands-on experience and knowledge about the environment, both natural and human-altered.

b) Have practical experience with several activities and curriculums designed to teach environmental education to K-12 students.

c) Learn methods and techniques for infusing environmental education into their curriculum.

d) Gain confidence in their ability to infuse environmental education into their curriculum.

2) Identify and establish a network of 15-20 ad hoc faculty to deliver UWSP-designed teacher inservice courses in environmental education.

3) Develop a non-thesis option extended graduate degree (masters) program to train inservice teachers as environmental education specialists.

Course Development

Course content will be designed to eliminate or reduce teacher's real or perceived barriers to the infusion of EE in their classrooms.

It is primarily the non-science teachers who have identified a lack of knowledge as a prime deterrent to their teaching of EE (Ham and Sewing 1987). This program will be designed to attract K-12 teachers from all discipline backgrounds.

In Buethe's 1975 and 1985 parallel study, teachers identified a lack of time to prepare and present EE in their classrooms as a significant barrier to EE implementation. Introduction of practical methods for infusion of EE into all areas of the K-12 curriculum will be stressed to eliminate the perception of EE as a separate course requiring additional time commitment. The program will provide opportunities for hands-on experience with a variety of EE instructional methods and techniques appropriate to all grade levels.

Teachers also express concern over a lack of time and money for field trips (Wilke 1979). The difference between outdoor education and EE will be identified and training will be provided in methods and techniques promoting the classroom and schoolyard as primary sites for EE. These instructional methods and techniques will incorporate inexpensive and readily available materials and equipment.

In general, teachers have a positive attitude toward teaching EE, but lack the commitment to do so (Ham et. al., 1987). The program content will be designed, above all, to be motivational.

Four modularized courses are being developed to address the areas:

1) Introduction to EE

2) EE Curriculum Materials

3) Environmental Issues and the Classroom

4) EE Teaching Methods

Ad Hoc Faculty

This program will be designed to utilize identified ad hoc faculty in the planning, development, and presentation of the teacher inservice courses. Nature center directors and naturalists, Wisconsin Department of Natural Resource personnel and other environmental education specialists will be identified and recruited based on their expertise and commitment to EE teaching and methods, and grouped by geographic area. A graduate degree and classroom teaching experience will be required. Training will be offered to the natural resource and environmental education specialists selected.

Marketing the Program

A marketing plan will be developed to promote the program to the state's K-12 teachers. The program's hands-on, practical and interactive approach will be stressed.

School Superintendent Grover has committed support for the program and the Department of Public Instruction will cooperate with promotion.

Quality Control

The program will be continuously evaluated throughout the planning and implementation process. One of the roles of the steering committee and ad hoc faculty is to provide ongoing input and feedback. Evaluations will be collected from the participants at the end of each workshop as a means of assessing participants' progress toward the program objectives.

The Center staff will also conduct periodic assessments to determine if the goal of improved teacher environmental literacy has been achieved by the program.

Timeline

Spring 1989

1) Steering committee formed and graduate student identified to work on program master plan.

2) Initial meeting of steering committee and identification of goals and objectives.

Summer 1989

1) First draft of program master plan completed.

Fall 1989

1) Faculty member hired to administer the program.

2) Ad hoc faculty identified and recruited.

3) Expand steering committee to incorporate other disciplines.

4) Draft of first course completed.

Winter 1989

1) Offer training program for ad hoc faculty and refine course with their input.

2) Marketing plan developed.

Spring 1990

1) First course offered.

2) Draft of second and third courses completed.

Summer 1990

1) Second ad hoc workshop and refine courses two and three.

Fall 1990

1) Second and third courses offered.

2) Draft of fourth course completed.

Spring 1991

1) Third ad hoc faculty workshop and refine course four.

2) Fourth course offered.

Conclusion

The major objective of EE has been repeatedly established in the literature as the development of an "environmentally literate citizenry that is both competent to take action on critical environmental issues and willing to take action" (Hungerford 1976, Tbilisi 1978).

If environmental education is to be effective in achieving this goal of creating an environmentally literate and active citizenry, teachers must be provided with inservice training programs which supply them not only with effective curriculum materials, but also with the appropriate knowledge and skills to teach EE. The UWSP environmental education inservice teacher training program is being developed and implemented to address these needs of Wisconsin teachers.

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Up the River: A Cooperative River Project

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Abstract

The "Up the River" curriculum session is a model of how cooperation between a private nature center and public agencies can result in exciting field activities and infusion of cogent watershed curricula into area schools.

Working Together—Five Agencies as a Conservation Education Team

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Abstract

In Oklahoma, the state agencies of Wildlife, Forestry, 4-H, Libraries and Conservation Commission have come together as a team to promote conservation education, therefore, offering more resources and information to educators and youth leaders.

The public we serve: individuals interested in the environment, teachers, youth leaders, and land owners, want information on natural resources. All too often, however, when they contact an agency, they go away empty-handed and more confused than ever about environmental issues and where to get help.

Although some states have all their natural resource related agencies as part of a "super agency," most do not. These states that do not often lack communication between the various agencies or even within agencies to direct the public to the proper source of information.

A Team Approach

Since 1983, with the co-sponsorship of Project WILD in Oklahoma, the Oklahoma Conservation Commission and the Oklahoma Department of Wildlife Conservation have established a network for distributing information to the public. In 1986, the Oklahoma Conservation Commission and the Forestry Division of the State Department of Agriculture became co-sponsors of Project Learning Tree in Oklahoma—thus enlarging the network. By January 1987, these three agencies began offering a quarterly newsletter, The Web, to all participants of their workshops and to anyone else upon request. The Web currently reaches over 8,000 individuals.

By April 1989, over 5,000 educators had participated in Project WILD workshops and over 1,000 in Project Learning Tree workshops. The potential number of students reached by these two programs is estimated to be over 200,000 and 62,000 respectively.

The conservation team grew in 1988 to include the alliance of State 4-H programs, with participation in State Round-up and instruction of volunteer leaders and extension agents by PLT and WILD coordinators. In addition, coordinators in both projects became part of a 4-H Natural Resource Committee and assisted with a Wildlife Leaders Conference.

Department of Libraries joined the network in the fall of 1988 by distributing conservation education materials and providing information on resource agency contacts to all school and city librarians. The other agencies in the team have also helped publicize and promote a Department of Libraries—Center for the Book program, "The Year of the Young Reader." In the spring of 1989, the partnership was strengthened further by Department of Libraries and Project WILD co-sponsoring a guest speaker, Byrd Baylor of Oklahoma. Other sponsors of this presentation included the Oklahoma City Zoo, the State Arts Council of Oklahoma, National Endowment for the Arts, Oklahoma Center for the Book, Oklahoma University School of Library and Information Studies.

Other Projects

Many publications have been developed across division and department lines to add to the conservation education resources available. The packets developed by the Nongame Program staff and I&E Division of the ODWC include: Oklahoma Winter Birds, Wildlife Management, and Bluebird teaching units. An aquatic resources unit on Oklahoma Fish was developed by the Fisheries Division and the I&E Division as well. These packets of materials have reached thousands of teachers and youth leaders.

These efforts to promote conservation education in Oklahoma have increased the distribution of publications previously available, but often unknown to the public. The publication, Critters and Concepts, was originally developed nearly ten years ago. A printing of 10,000 copies was produced with distribution taking place until 1987. However, a second printing of 3,000 copies lasted only a year, from 1988 to 1989, as a result of this expanded network. A third printing was completed in July 1989 to meet the needs of teachers and youth leaders who have discovered these available resources.

As an offshoot of these contacts, the Forestry Division and the Nongame Program of the ODWC have developed a backyard wildlife habitat program. The available information and bundles of plants (for purchase through the Forestry Division tree nursery) are useful not only to the general public, but also to schools to develop outdoor classroom sites.

There are guidelines and correlations available to aid in using the outdoors as a teaching tool and to incorporate Project WILD and Project Learning Tree activities into the curriculum. Resource people from various agencies lend their expertise to the development of these outdoor classroom sites as well. In addition, they help expand the conservation education team by assisting with presentations at outdoor field days coordinated by Conservation Districts and schools throughout the state. These agencies include: Soil Conservation Service, U.S. Army Corps of Engineers, universities, State Health Department, State Tourism and Recreation Department (which includes state parks), and U.S. Fish and Wildlife Service.

Summary

The public has benefitted from the continued expansion of this conservation education network within Oklahoma. Two private foundations, the Noble and the Phillips, awarded grants to conservation education to expand and financial base and allow further development of program offerings. Other agencies and groups that also help promote the various programs and publications include: the Governor's Office, Oklahoma Wildlife Federation, Oxley Nature Center of Tulsa, Martin Park Nature Center of Oklahoma City, Oklahoma Museum of Natural History, Tulsa Zoo, Oklahoma Historical Society, OSU Extension Service, Oklahoma Association of Conservation Districts, and many others.

There is more to be done, but by working as a team, the efforts of these agencies have gone much further and reached more people than they would have as a solitary effort.

Reach outside division and agency boundaries, try a team approach, such as Oklahoma's. The public will be better informed and the agencies will benefit by the public's increased awareness, as well.

Population Carrying Capacity and the Future of National Parks

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Abstract

Although the nation's population has historically grown exponentially, overpopulation of national parks was not recognized as a serious problem prior to 1962. In that year, the Outdoor Recreation Resources Review Commission (ORRRC) reported that the nation's recreational patterns were being dramatically altered by expanding population, increased leisure time, greater mobility, and growing affluence. Over twenty years later, the ORRRC found that the same problems that they had discovered in 1962 had intensified and had created an urgency for reassessing the management of national parks. Exceeding the carrying capacity (both biological and social) of a park leads to ecosystemic destruction and makes parks unattractive to visitors. On the one hand, the park service faces the problem of making parks attractive and accessible to visitors and, on the other hand, keeping visitation below a certain threshold. A possible solution is to designate specific parks for different recreational/access opportunities. While some parks are characterized by critical, fragile ecosystems, others occupy fairly stable environments. Recreation, therefore, could be based on the stability of the ecosystem of the park. Other factors such as accessability, geographical location, etc. could also be considered. This paper analyzes this dilemma and offers some proposals for action. Some suggestions for long-term national park management are also offered.

Exceeding the carrying capacity of parks leads to ecosystem destruction and reduces attractiveness. To alleviate this problem, the National Park Service has focused on raising park fees, limiting visitation, and acquiring more parklands. Designating parks for different recreational/access opportunities is proposed as a solution along with creative alternatives to facilitate the public's recreation needs.

Carrying Capacity and National Parks

For the purpose of this study, carrying capacity is defined as the maximum human population that our National Parks, individually and collectively, can sustain. As human usage grows, the ability of an ecosystem to maintain wilderness components declines. Hence, as too many visitors stress the flora and fauna, a population threshold, reflecting the carrying capacity of the area, must be placed on visitation.

The National Parks and Conservation Association (NPCA) estimates that visitation to National Parks has increased tenfold since 1930 (Pritchard,1987, p. 5). As our cities become crowded and open areas diminish, people have a need for open space. Population growth is rapidly diminishing the number of available undeveloped acres for park expansion. As a result of rapid development and increasing urbanization, it becomes more important to preserve suitable parkland areas.

Parks attract visitors because they offer increased recreation opportunities. Active recreation, which if for the most part, motor driven, demands more space and exerts greater stress on the environment. In addition, it threatens and reduces the carrying capacity of National Parks. Because of this degradation, "In 1978, congress demanded carrying capacities issued for activities by parks" (Loomis, 1985, p. 14).

When considering the maximum population that can be permitted to participate in any activity offered by a park, it is also important to consider how various activities relate to each another. When different activities are pursued in the same or adjacent areas, a synergistic effect may result in which both activities, measured together, create a greater impact than each individual activity. Further, the recreational pursuits may have varying impacts on ecosystems depending on the local environmental/climatic conditions.

If damage estimates for each recreation activity could be reported, the resulting data would help park managers plan for future recreation resource needs. This is important as, parks were created so that people could enjoy the aesthetic and recreational benefits of the outdoors.

In general, smaller numbers of passive users have little impact on the environment. Active users in large numbers with sophisticated needs will lead to larger impacts on both the natural and built environment. Activities and amenities such as canyon slides, electricity in campgrounds, paved roads, etc. degrade the quality of the ecosystem.

In response, the National Park Service has increased entrance fees to help relieve the environmental stress of visitors. Americans have demanded more services to satisfy a wider range of recreation interests. Activities that have been recently added to the park recreational menu are: alpine slides, snowmobile travel, motor boat access, and off-road vehicle trails. This is because the mobility of Americans is reflected in individuals seeking pleasure rather than repose in parks.

In order to save parks from being "loved to death" by the public, the National Park Service has devised ways to deal with this situation. Measures taken to reduce the stress of park overpopulation will be discussed below. They are: raising park fees; acquiring new parkland; and regulating visitor length of stay.

Strategies Employed by the National Park Service to Reduce the Strain of the Population on Parks

In 1984, the National Park Service charged entrance fees at sixty of our nation's 334 parks. Admission for private vehicles was one dollar to three dollars per day; bicycles were charged fifty cents per day while campsite fees ranged from four dollars to eight dollars per night or, with electricity, four dollars to ten dollars (Fromme, 1984, p.31).

The National Park Service increased entrance fees in 1987 for the first time since 1972 over the objections of users. This increase included the following policies:

-- Seventy-two parks charged entrance fees for the first time.
-- Sixty-two parks raised their entrance fees (Durenberger, 1987, p. 11).

The Park Service now recommends that, before planning a visit, campers should check with the superintendent to find out if there is a limit placed on the length of stay. In 1984,the length of stay restriction was only enforced during peak visitation seasons. As of 1988, campgrounds in National Parks are on a "first come-first serve" basis. There are some locations, however, that accept reservations (National Park Foundation, p. vi, 1988).

Because conflict has developed between the Park Service and recreationists who expect free access, the National Park Service is pursuing other strategies to make the park experience more available. One method is to acquire land for new parks and to add land to existing parks to ease the strain. However, the need has become more pressing recently, as the Park Service seeks to meet the demands of the country's growing, and increasingly mobile, population. Acquisition has been impeded because land is scarcer.

The Park Service's interests now conflict with private enterprise over the purchase of new land, because commercial establishments are built on park perimeters. This threatens the quality of the park ecosystems and effectively prohibits park expansion.

The NPCA has made recommendations to the federal government which may alleviate some land acquisition problems. The NPCA gives top priority to acquisition of "threatened or endangered species habitat within or around park areas" (NPCA, 1988, p. 23-24).

Other NPCA priorities include:

-- Acquire mineral rights in parks to halt future mineral exploitation.
-- Use federal land exchange channels to acquire additional parkland (This procedure would allow National Parks to exchange lands of lesser value for sensitive land areas.) (NPCA, 1988, pp. 23-24).

These recommendations may run into trouble with the public because they will take land away from public recreation to provide increased protection for environmentally sensitive areas. In sum, the resulting problem is that our National Parks cannot provide the recreation demands of the American public while preserving ecologically valuable areas.

Recommendations

The crisis facing National Parks today has become very serious. In essence, it is an example of Garret Hardin's "tragedy of the commons" (Menard and Moen, p. 108). Hardin points out the increasing degradation that results from ever-increasing visitor pressure in National Parks. Hardin states:

> At the present, they (American parks) are open to all, without limit. The parks themselves are limited in extent-there is only one Yosemite Valley-whereas population seems to grow without limit... Plainly, we must soon cease to treat the parks as commons or they will be of no value to anyone. (Menard and Moen, p. 108).

Each of the methods that the NPS has devised to deal with overcrowding causes new conflicts and has limitations. In a word, they are short-term solutions to long-term problems of overcrowding. Long-term solutions must be found which will attain sustainability in public lands. Technology cannot provide answers in this instance, because parks are a living resource. A finite amount of land cannot indefinitely support an increasing number of people. The only viable solution is to limit/restrict entrance to parks and redirect recreation in other directions. Quotas should be set for all seasons based on the ability of the environment to recover from the pressure of human use.

Several additional steps can be taken to minimize damage to park-lands. Although they will not solve all problems, these recommendations will go a long way toward stabilizing the future of National Parks.

1) Activities that are incompatible with the specific park environment should be limited or discontinued. The sensitivity of the resource should dictate the types of recreation allowed in each park setting. In addition, buffer zones should be established around critical habitat areas. In these zones no recreation activities at all should be permitted. Moving outward from these zones, compatible passive recreation, such as day-hiking, in limited amounts could be permitted. Farther out, more intensive uses could be allowed.

2) Alternative recreation sites should be established by local government or private enterprise. These would be areas that can cater to the active recreation demands of the American public. If active recreation is moved adjacent to urban areas, National Parks might be able to provide the benefits of passive recreation to a greater number of individuals in a clean environment. The following are proposed:

-- Increase the number of metroparks.
-- Provide active recreation areas along interstate highway systems.
-- Create recreation opportunities in rural areas lying outside of urban/suburban centers.
-- When drafting a regional development plan, consider the area as a whole rather than as land fragments zoned for different, possibly conflicting uses in order to ensure compatible management.

In order for citizens to enjoy our National Parks into the future, they should learn to accept the restrictions that must be placed on entrance and recreation activities in order to preserve the beauty, value, and integrity of the National Parks in the United States.

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Coming Together in Pennsylvania; A Statewide Movement of Environmental Cooperation and Networking

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Abstract

A master plan drives environmental education in Pennsylvania with cooperation between the Departments of Environmental Resources and Education. Recognition of outstanding programs, teacher training, conservation schools and interagency planning are central to the movements success.

All environmental education in Pennsylvania is based on the Master Plan for Environmental Education prepared in 1984 by a special task force. Our base of operation includes the schools, churches, service clubs, civic groups, and the citizens at large in the commonwealth.

Several programs have been initiated that are quite successful and involve many school districts. First, we have established environmental education week in Pennsylvania and a search for exemplary environmental education programs across the state. Environmental Education Week is coordinated with the Pennsylvania Alliance for Environmental Education (PAEE) and all other state agencies in the interagency network of Pennsylvania. The major project of this week is a packet of environmental education classroom activities and resource materials sent to over 6,000 school buildings. Our search for exemplary environmental education programs is also a statewide effort and seeks to identify those schools with outstanding environmental programs. The Search for Excellence is a cooperative effort with the Pennsylvania Association of Conservation Districts, PAEE, and the Department of Education.

A second effort is focused on pre-service teacher training at the college level and the in-service level of practicing educators. Last year, (1988-89) over 2,000 teachers were trained and 800+ college seniors prior to their student teaching. The office has worked with both public and private post-secondary institutions in this effort. Many of the colleges and universities we work with are providing pre-service environmental education training for all elementary graduates.

The office continues to be involved with on-site school visits where curriculum is checked and the teaching of environmental education validated. About 40 school districts have been checked over the last year and our three year total stands at over 120 districts. This effort by the Department of Education has done much to guarantee that environmental education is being taught.

A major portion of our activity is focused on interagency cooperation. We are working closely with the Department of Environmental Resources to institute new curriculum on recycling in the schools of the Commonwealth. Similar efforts are carried out with the conservation districts, fish and game commissions, and sportsmen's groups. These contacts have established networks within the state that promote a unified effort in our public schools. Currently, the Pennsylvania Fish Commission is developing an aquatic resource curriculum effort that is specific for Pennsylvania teachers. This program incorporates Aquatic Wild and programs that have been developed by the Department of Environmental Resources and institutions like the Baltimore Aquarium. The Department of Education continues to cooperate with the Bureau of Forestry for Project Learning Tree and the Game Commission for Project WILD.

Special pride is taken with the various conferences we go to each year. During 1988 presentations were made at two Environmental Protection Agency Conferences for Region III. Workshops were held at the National Science Teachers Convention in Pittsburgh, Pennsylvania and at our state curriculum conference. The staff has also worked closely with the Pennsylvania Alliance for Environmental Education at their annual conference.

Public education and information is an on-going part of our collective efforts. We continue to present slide programs on solid wastes, groundwater, the Chesapeake Bay, land ethics, habitat loss, and environmental education. Our presentations cover all civic organizations and many professional groups. This year we had the unique privilege of working with National Garden Club leaders on a program titled, "Showcase of Environmental Education."

As we begin our fifth year in the Department of Education, it is obvious that much needs to be done for environmental education to become the most effective tool possible for developing environmental literacy. To assist us in this goal we have recently begun an intense project to establish a legislative base for environmental education. This cooperative effort has brought together the Pennsylvania Federation of Sportsmen's Clubs, the Department of Environmental Resources, the Audubon Society, Sierra Clubs, and education for a total effort to permanently establish the environmental education program in our schools.

These continuing programs and network activities are moving environmental education into the proper place it deserves in the school curriculum of Pennsylvania. The thrust of these activities have a concern for our collective environmental future.

Natural Resources Outdoor Discovery Programs for Third and Fourth Graders: Eagle's Nest and Owl's Roost

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Abstract

Colorado State University Cooperative Extension in cooperation with the Jefferson County Public Schools sponsor five-day environmental ste-

wardship programs in the Colorado Front Range outdoors. Learn what makes this award-winning program (in its sixteenth year) successful.

Strand 3

Educating About Environmental Issues and Policies

Teach About Geese
Environmental Education Responds to a Wildlife Conservation Issue in Alaska

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Abstract

Populations of four species of geese which nest in the Yukon-Kuskokwim Delta and migrate along the Pacific Flyway have declined severely over the last twenty years. The Yukon-Kuskokwim Delta Goose Management Plan provides a cooperative framework for research and management efforts dedicated to reverse the goose population decline. A vital aspect is the Information & Education Program, designed to inform Pacific Flyway residents about the plan, and to encourage voluntary reduction of hunting. An important component of the Information & Education Program is the "Teach About Geese" curriculum. The "Teach About Geese" curriculum represents teaching through experiential learning, the adaptation of excellent available materials to meet local needs and concerns with input from those who will be its ultimate users, a cooperative effort among many individuals and agencies to provide training and credit courses for rural Alaskan teachers.

Populations of four species of geese which migrate along the Pacific Flyway have declined severely over the last twenty years. Three of these, the cackling Canada goose, the Pacific white-fronted goose, and the black brant are a shared resource among native subsistence hunters in remote western Alaska and sport hunters throughout California, Washington, and Oregon. The fourth, the emperor goose, spends its entire life in Alaska, overwintering on the Aleutian Islands.

The Issue - Declining Populations of Geese

Abrupt drops in populations of cacklers from 350,000 in the mid-1960's to about 30,000 in 1984, as well as moderate to severe population losses of the other three species, prompted immediate action to address a long-standing concern for the geese. The result is known as the Yukon-Kuskokwim Delta Goose Management Plan.

One Cause - Over Hunting

Biologists believe that hunting is one of the main factors contributing to the decline of the goose populations. Traditionally, native Alaskans have taken eggs and waterfowl during the spring and summer. Also, habitat loss in the lower 48 states is believed to be an important factor. Poor weather, disease, predation, and contamination by pollutants may be other factors.

Some possible causes for the goose population decline cannot be controlled. However, we can do something about the human caused elements.

The Plan - A Unique Approach

The Yukon-Kuskokwim Delta Goose Management Plan was developed to provide a cooperative framework for the research and management efforts needed to deal with these problems in the remote and isolated reaches of the Delta. The plan is unique because it directly involves Alaska native subsistence users and sport hunters from the lower 48 states in developing the terms of the plan. Participants in the plan's development were the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, the California Department of Fish and Game, the California Waterfowl Association, Nunam Kitlutsisti (Alaska), the Waterfowl Habitat Owners Alliance (California), and the Oregon Department of Fish and Game.

The plan calls for reductions in harvest of geese by all parties and agreement by all parties to halt sport and subsistence hunting if geese critical thresholds are reached. The limitations are in effect until the goose populations rise above certain numbers for each species.

Information

As compliance with the plan was voluntary on the part of the people of the Yukon-Kuskokwim Delta, one vital aspect was the establishment of an Alaskan information and education task force. This task force began an intensive campaign to inform all goose hunters from Alaska to Mexico about the plan. The task force created a myriad of products to accomplish its mission. A poster contest held for local school children created awareness in the schools. The winning posters were made into calendars which include information about the geese and are distributed to village residents.

The U.S. Fish and Wildlife Service hired resident native Alaskans to serve as Refuge Information Technicians (RITs). These RITs have held meetings, in both the native Yupik language and English, in the 56 villages on the Yukon Delta National Wildlife Refuge. The RITs also give presentations to schools using a comic book, The Adventures of Simon and Mary Nanantuk, which explains important concepts relating to the goose issue.

Education

As the RITs are only able to make occasional classroom presentations, materials for teachers to use in classrooms throughout the year were needed. Thus, the "Teach About Geese" curriculum was conceived. Many of the young men hunting geese are high school students and the younger students bring home information to their parents.

Evolution of a Curriculum

The U.S. Fish and Wildlife Service and the Alaska Natural Resource and Outdoor Education Association were offering credit courses for teachers statewide on wildlife education curricula. The next step was to "Alaskanize" and "goosize" these materials and offer workshops for local teachers.

A pilot workshop was held in Bethel, Alaska in March, 1985. Teachers received all four curricula materials, but the activities done during the course were adapted to the Yukon-Kuskokwim Delta. The course assignment was to use activities from each curriculum in the classroom, then to localize the activities to the Delta and the goose issue. The materials submitted by the teachers, and the activities used during the course became the foundation for the first draft of a "Teach About Geese" curriculum.

Test and Revise

During the summer a draft curriculum was produced. The curriculum is interdisciplinary, targeted for grades K-12, with an emphasis on middle grades 6, 7, and 8. Topics addressed are: basic ecological principles, values and importance of wetlands, migration and population dynamics, wildlife management, and planning and taking action on the goose issue. Outdoor field investigations are an integral component.

Five more credit courses were held in the 1985-86 school year. Teachers used the lesson plans with their classes and submitted evaluations of the activities. This input was incorporated into the draft materials and a second draft was produced. The second draft was field tested in the 86-87 school year. In 88-89 the materials were revised and illustrated, typeset, and printed ready for the 1988-89 school year.

Volunteer Instructors are Crux of Program

Providing relevant, localized materials for teachers and students is exciting in itself, yet there is another level of this project that is unique. The instructors for all but the pilot workshop were volunteers from the Alaska Natural Resource and Outdoor Education Association. These volunteers are all highly trained, qualified facilitators in each of the four wildlife education curricula, and have attended a special week long "goose orientation" session. The orientation session provided instructors with background on the goose issue, the contents of the "Teach About Geese" curricula, tips for traveling and working in rural Alaska, and gave participants an opportunity to develop a team spirit for the project. Some facilitators are actually teachers in rural areas.

Each workshop is led by a team of two trained volunteer instructors. A staff member from the Yukon Delta National Wildlife Refuge also gives a presentation about the refuge and the goose issue. When possible, the local RIT attends, contributing valuable cultural input and a bilingual aspect. Teacher's aids and community members are encouraged to attend.

The 56 villages in the Yukon Delta National Wildlife Refuge span an area of twenty million acres. It is a logistical challenge to hold courses to reach such a far-flung audience. Air routes and school district jurisdictions have to be considered. Workshops are usually held in a location central to four or five villages, with suitable air access, and teachers from neighboring villages are invited to attend the course at the host school. Instructors stay in the village school or in homes of teachers, and eat at school cafeterias or bring food. A field trip is always part of each course, even in less than ideal conditions. This makes for a intensive weekend, from Friday evening through Sunday noon. Teachers enjoy the opportunity to interact with each other, and their evaluations reveal they returned home with many usable ideas.

The Final Product

The "Teach About Geese" curriculum is in a kit format. The kit includes a color poster, seven charts, and two game boards: a migration game and a goose "trivial pursuit" game. A background information booklet for the teacher (Facts About Geese) and the curriculum guide itself provide the heart of the kit. In addition, a supplement contains reproducible "Teach About Geese" (TAG) sheets. The TAG sheets include all the student worksheets, patterns, role cards, maps, data cards, etc. needed to complete the lesson plans. There is a goose activity book for primary grades, a mobile, a kite, even an origami goose!

The "Teach About Geese" kit also contains lots of "extras," such as a flyway map, map of the United States (for plotting bird band returns), topographical maps of local areas, a cassette tape of bird calls, a set of student binoculars, and a variety of leaflets, supplemental reading materials and bird identification guides. Each school on the Yukon-Kuskokwim Delta National Wildlife Refuge will get a complete kit, with duplicate copies of the curriculum guide and background information for each teacher.

A field trip kit will have equipment that can be used by students on field trips: dip nets, magnifying lenses, collecting buckets, thermometers, etc. Teachers can check out the field trip kit from the district office or the Yukon Delta National Wildlife Refuge to use during wetland study field trips.

More Than a Brochure

The beauty of the "Teach About Geese" curriculum is that is represents more than simply informational materials. It represents implementation of a way of teaching about critical wildlife issues through experiential learning.

It represents a cooperative effort among many individuals and agencies to provide training and credit courses for rural Alaskan teachers. It represents the adaptation of excellent available materials to meet local needs and concerns. It represents material developed with input from those who will be its ultimate users. It represents an extension of scientific research to the public through education. It represents an issue concerning a resource shared by people along the Pacific Flyway, being addressed with a voluntary, educational approach. "Teach About Geese" meets needs of kids - for relevant study topics, teachers - for localized materials, and agencies for a long-term solution of a resource/people problem.

Educating Wisconsin Adults About Toxic Substance Management: A Model for Educating the Nonformal Adult Audience about Environmental Issues

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Abstract

This presentation will describe an education model which synthesizes tested education outreach strands about toxic substances risks and management into a system for application to education about other environmental issues. Examples of activities and multi-media materials used to enable the success of the toxics program will be included.

Educational Need

Ever since revelations about the dangers of environmental accumulation of DDT, toxic substances have been a concern to the general public. In spite of oil spills, Superfund sites, Bhopal deaths, cross billed cormorants, fish advisories, birth defects and leukemias, organized efforts by environmental educators to educate the public on the significance of these and similar events or impacts have been inadequate. (For an excellent summary of toxic substance problems and relevant education goals see Ottum, 1984). Although an adequate variety of publications on a number of toxic substance topics are available from the EPA, private organizations (such as Concern, Inc.) and some state agencies (such as extension publications listed in the "Water Quality Resource Materials Catalog"), with the exception of the League of Women Voters education network, organized outreach programs which use these materials generally are not available.

The evolution of environmentally sound personal and public policies for the management of toxic substances requires that our public managers and citizens become much more sophisticated in their understanding of toxic substance concerns. As a public, we need to know how to manage the toxic substances currently in our environment; how to determine appropriate exposure risks for those we plan to use as well as for those we are cleaning up; and how to choose which hazardous substances we want to manage in our future.

Managing toxic substances is difficult due to the complexity of research required to understand the toxicant and its toxicity. As a result, risk management is often a political decision as well as a scientific one. To facilitate public participation, educators will need to teach adults about toxic substances and related controversies in a way which is understandable by the lay person. The challenge is to make the "invisible" toxic substance real.

Choices in Educational Models and Objectives

When an educator or educational institution (formal or nonformal) decides to embark on a public policy education program, a number of factors required for program success must be identified. In a North Central Region Extension Publication, Richard Barrows (Barrows) provides a list of prerequisites for a successful extension program including its level of controversy and significance, availability of supportive research and the notification of key individuals. In addition to the Barrows' prerequisites, an education model must be chosen and required educational, staff and financial resources must be determined. An educational model will involve both a system of choosing the individuals to be educated (this may be specific individuals or a particular, defined audience) and a appropriate pedagogical strategy.

Choice of individuals will depend on which action theory is most likely to provide the education required by the type of controversy. Educators may choose: community power actors (four definitions are summarized by Tait), leaders (seven definitions are summarized by Terry, 1986), or citizens known to participate in public policy decision making (Force, 1986). A pedagogical strategy may be derived from a traditional environmental education model such as the one described by Stapp (1974), a model which refines the Stapp model to develop predictors of responsible environmental behavior (Hines, 1986), an advocacy model, a consequences education model (both described in Barrows) or a change theory model (Jickling, 1985). There are many overlapping concepts among these definitions and models.

Techniques for Teaching Adults

Once an audience and a pedagogical strategy have been determined, one of many educational techniques must be chosen. In a 1985 speech to the general session of the 1985 NAEE conference, Jay Hair of the National Wildlife Federation reminded educators that "developing high quality educational materials is not enough . . .we have to use the most effective promotional techniques to get the materials into the proper hands so that the information winds up where it is supposed to — in the minds of people." (Hair, 1985).

Typical adult education mechanisms include:

-- Courses/workshops offered by University Outreach, nature centers, environmental organizations, civic organizations.
-- Nature center/museum exhibits.
-- Personal problem solving/personal contact with expert.
-- Citizen participation in any of its forms.
-- Media presentations.
-- Libraries.

Two studies have examined preferred adult learning and participation styles (Nichols, 1981 and Williams, 1985). Although these two studies are not conclusive, three themes emerge: a) interest in a topic will play a role in defining who is willing to learn; b) those who can be described as "participating citizens" enjoy meeting in groups; and c) due to variation in learning style preferences a variety of education mechanisms need to be employed for a successful public education program.

Educating Wisconsin Adults About Toxic Substance Management

This model takes advantage of the reputation, human and economic resources and delivery mechanisms of two statewide networks which are part of the land grant college system, Cooperative Extension and University Outreach. Similar program support could be developed in many other states. College and university outreach programs offer another institutional structure through which toxic substance education programs can be offered. On a different scale, other institutions such as a statewide environmental organization, a regional Resource Conservation and Development Council or a local Soil Conservation District could offer institutional support where learning materials have already been identified.

The purpose of the University of Wisconsin toxic substance education program has been as follows:

1) To identify selected leader groups.

2) To determine educational methods and develop materials appropriate to selected leader groups.

3) To provide information about toxics in an understandable context.

4) To identify other materials available to support education programs.

Audience identification and leader training have resulted in a positive response to Wisconsin's programs. Techniques for identifying community leaders were borrowed from identification strategies mentioned earlier. These strategies include traditionally defined leaders (positional or organizational), but include community leaders determined through a variety of other means as well.

Leader groups identified for toxic substance education include:

1) Civic groups already organized in a "leader training"/ "leader teaches small groups" structure, such as: Extension Homemakers, state Garden Club regional leaders, Farm Bureau Women district leaders.

2) Cooperative Extension County Agents.

3) Local officials, especially those identified by experienced Extension Agents, including elected officials and the following categories of employees: public health, emergency government, county supervisors on environmental committees, solid waste managers, related public committees from towns and cities.

4) Youth leaders (formal and nonformal).

5) Environmental group/civic group activists and leaders.

Toxic substance issues, identified as meeting public policy education criteria, are listed below:

1) Household hazardous waste.

2) Community management of community generated hazardous waste.

3) Indoor air quality - health effects of household maintenance chemicals, formaldehyde, asbestos, combustion products, biological contaminants, radon.

4) Hazardous wastes from schools.

5) Management of wastes on farms.

6) Wisconsin toxic issues series - groundwater, surface water, air. Programs include a problem statement, regulations and practices which exist to date, directions needed for the future.

7) How to teach children about toxic substances in the environment.

Pedagogical strategies and techniques were chosen based on principles expressed in models cited earlier. All programs include elements of awareness, values, knowledge, skills and action in their content. Through the choice of leader groups the program organizer has made an attempt to include individuals who already meet some of the Hines predictors of responsible environmental behavior, such as internal locus of control, personal responsibility, and knowledge of action strategies/skills.

Educational techniques can be summarized by the following list:

1) Educational Telephone Network (ETN) programs available in all 72 counties on six of the eight listed topics.

2) Development of leader training support materials, such as:

a) Table top displays which can be mailed.

b) Topic outlines with supporting handouts chosen for audience.

c) Canned presentation including all needed handouts and suggestions for other support materials.

d) Slide/tape/script or 1/2" video appropriate to discussion topic.

3) Development of a one credit course for teachers and youth leaders providing an opportunity to learn how to teach about toxic substances.

4) Support and cooperation for state organizations which organize their own leader training programs, but would like assistance in determining appropriate topics or resources or need help designing an appropriate resource.

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National Issues Forum: A Process for Public Dialogue on the Environment

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Abstract

National Issues Forums are a model citizens can use to learn about today's complex environmental policy issues. Public forums bring citizens together in their communities, not to advocate any specific solution, but to provide a means for them to join in a dialogue and play a role in the policymaking process.

Environmental Issues Around the World

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Abstract

This paper describes the experience of traveling around the world on a 100-day voyage with the "Semester at Sea" program aboard the S.S. Universe. A description of the voyage and information on the "Semester at Sea" program are provided in this paper along with educational needs around the world.

Introduction

The "Semester at Sea" is a "floating university" program administered by the University of Pittsburgh. Twice annually, the S.S. Universe circumnavigates the world with a group of 450 students taking a liberal arts menu of classes (many transferrable to home universities) from faculty recruited from colleges and universities throughout the U.S. and Canada. For more information on the "Semester at Sea" program, write to:

Semester at Sea
Institute for Shipboard Education
2 E Forbes Quadrangle
University of Pittsburgh
Pittsburgh, PA 15260
(412) 648-7490

The Spring 1989 Voyage

The spring 1989 voyage of the S.S. Universe began in Nassau, Bahamas, in the second week of January and ended in Taipei, Taiwan, late in April. The ship spent an average of approximately 4-5 days in the following ports: Cadiz, Spain; Dbrovnik, Yugoslavia; Odessa, USSR (side trip to Moscow); Istanbul, Turkey; Cairo, Egypt; Madras, India (side trip to Delhi Agra); Penang, Malaysia; Singapore; Shanghai, China (side trip to Beijing); Kobe, Japan; and Taipei, Taiwan. Because of the limitations placed in the length of this paper, discussion of several ports has been deleted. Contact the author for further information.

Dbrovnik, Yugoslavia

On our voyage from Cadiz to the old walled city of Dbrovnik, Yugoslavia, we witnessed the deforestation of southern Spain, the significant pollution of the Mediterranean Sea, and sailed past several of the denuded islands that were once described by Homer in The Odessey and The Iliad as forested and lush. Dbrovnik is an ancient walled city on the Adriatic coast of Yugoslavia. In Dbrovnik, we were told that it hadn't rained (during the normally rainy season) for two months. The nenuded hillsides (once forested thousands of years ago), were bone dry, with fires burning out of control in some areas of the country. At the port in Dbrovnik, there were large lumber piles and raw logs imported from Malaysia and Indonesia.

Odessa, USSR

As we approached Odessa, we were informed that the ship's laundry would be closed to reduce pollution of the Odessa harbor. The Black Sea is heavily polluted and the government of the USSR is undertaking strict measures in an effort to protect this resort area's economy and environment.

In a side trip to Moscow, we toured the extensive Museum of Natural History at Moscow State University. Our guide and host, Dmitri Kavtaradze, lectured on environmental problems facing the USSR and the new initiatives of the government to educate citizens about environmental problems and to begin to properly manage them. Students from both the S.S. Universe and from Moscow State University concluded that the U.S. and the Soviet governments need to do a better job of incorporating environmental concerns into national and international decision-making processes.

Finally, it is interesting to note that although we were in Moscow in mid February, daytime temperatures were in the mid 40's. This year the USSR experienced one of the warmest winters on record.

Istanbul, Turkey

The most interesting aspects of Turkey, from the standpoint of an environmental educator, were the absence of forest cover on the land, the very heavy levels of air pollution (in and around Istanbul), and the growing environmental movement. The level of air pollution in Istanbul is so high that it produced tearing, rashes, coughing, and allergic reactions among many of the ship's personnel. Many of the communities in and about the greater Istanbul metropolitan area are becoming active in the effort to reduce the levels of urban water and air pollution. For example, faculty and students met with the founder and director of the green party in Istanbul. The director is a retired respiratory physician who had for years witnessed wide-scale premature morbidity and mortality from respiratory ailments caused or complicated by air pollution. After years of trying to prompt an appropriate governmental response, he decided to take direct political action. According to the director, the green party enjoys considerable grassroots support and is gaining in membership and strength in Turkey.

From our berth in the Port of Istanbul, we witnessed an incredibly beautiful sunset each evening. The sun would set between 4:00 and 5:00 p.m. in a cloud of dust and particulate matter against a backdrop of mosques and minarets. These beautiful sunsets, reflected off the waters of the Bosphorus, are the reason this area is often referred to as the "golden horn."

Cairo, Egypt

In Egypt we learned of the plight of the rural agricultural workers in and around the Aswan Dam from the Schistosoma blood fluke. Several sources indicated that the rate of infection among agricultural workers exceeded 80%, with an average age of death of male agricultural workers in some areas of 26!

Nearly 350 students and faculty journeyed to Cairo as the S.S. Universe sailed through the Suez Canal. In Cairo the Nile was running low and was heavily polluted. Several of the students visited their first urban slum in Cairo, an experience they will never forget.

Our trip to Cairo featured two trips to the pyramids, one at sunset and one at mid-day. We were impressed by the beauty, majesty, and antiquity of the pyramids. However, we were unprepared for the sight of the encroachment of urban slums on the Sphinx and the pyramids. We also experienced an unacceptably high level of crime at the pyramids. The pyramid guards were ineffective in policing the area, were easily bribed, and failed to keep people from climbing all over the pyramids.

Finally, our departure route from Cairo to the Red Sea took us out of the Nile River valley into the great deserts east of Cairo. Beyond the outskirts of Cairo we saw fill and solid waste piles for mile upon mile of landscape as far as the eye could see on both sides of the road. The Egyptians apparently view the desert as a wasteland and are treating it accordingly.

Madras, India

By the time we made port in Madras our students were seasoned travelers. Thus, they had little difficulty dealing with the poverty, pollution, and public health problems of India. The massive population of India (approaching 750 million) has put considerable stress on landscapes, resources, and urban systems.

One of the most interesting environmental programs promoted by the Indian government and several international development agencies (e.g., the World Bank and the Overseas Development Agency) is the Social Forestry program. This program which was originally funded to provide food, fuel, and fodder to the rural poor is clearly not achieving its worthy goals. State and national forestry departments are planting massive monocultural plantations of eucalyptus trees, that provide pulp and pole wood for the benefit of urban and industrial markets rather than the rural poor. In the state of Karnataka, one study of the beneficiaries of the social forestry program found that 97% of the wood products were going to relatively wealthy urban and industrial markets. Only 3% of the project benefits were going to the rural poor for whom the original project was intended.

Penang, Malaysia

From Penang, Malaysia, approximately 100 students and faculty traveled by plane, bus, then riverboat to the Tehran Negara National Park of Malaysia. For many, this was their first experience in a tropical rainforest. The students were amazed with the nature and diversity of the flora and fauna of the rainforest. Yet, on our journey to and from the national park, every other vehicle on the road was a log truck carrying logs for export (see Yugoslavia and Japan sections for log destinations). Students became very concerned for the fate of the rainforest and the biodiversity they had experienced. Later, in Singapore, we learned that President Aquino of the Philippines shut down log exports to Japan citing the need to protect the remaining rainforests and to retain forest product employment of the Philippines. We also learned that Indonesia curtailed log exports to Japan several years ago for similar reasons.

Singapore

Several decades ago Singapore established itself as a business enterprise zone which has resulted, today, in extraordinary urban and industrial development. In addition to the wealth of Singapore, our students were most impressed by the quality of natural, recreational, and urban environments on the island. As Singapore developed, the city managers invested heavily in pollution controls and public works as well as in transportation, housing, etc. The lesson learned is that conservation and development are not mutually exclusive, but rather mutually beneficial for human development.

Shanghai,China

As we sailed along the coast of China, the great human population and its environmental impact became readily apparent from the air and water pollution. Like Turkey and India, the sun set late in the afternoon in a haze of dust and air pollution. The Yellow Sea is muddied for miles offshore from the extraordinary sediment loads deposited by the Yangtze River. We found Shanghai, at the mouth of the Yangtze River, to be very crowded and heavily polluted from urban and industrial emissions.

At the Environmental Science Institute of Fudan University in Shanghai, we were told that generations of Chinese citizens in Shanghai had never seen a clean river water or a clear blue sky. The scientists expressed frustration with a system that had an extraordinary capability to monitor and analyze pollution problems, but no political will to manage them. The director of the institute estimated that 20% of the GNP of China is lost to damage caused by environmental pollution.

In Beijing, approximately 40 of our students had the extraordinary opportunity to have dinner with China's leading dissident, the astrophysicist Prof. Fang Lizhi. Fang's picture appeared on the cover of Time magazine in February after the Chinese government prevented him from going to dinner with President Bush when the President was in Beijing. In our meeting, Fang talked about human rights, democracy, and the responsibility of scientists to be active in social and political causes throughout the world. The timing of this meeting was extraordinary, because the student demonstrations in Tiananmen Square broke out the following week.

Throughout China we found strong support for China's one child policy. Everywhere we went, we saw one child families with the children obviously well cared for.

Finally, as we toured the Great Wall and Ming Tombs, it was discouraging to experience the denudation and desertification of the countryside. Few trees were visible from the panorama atop the Great Wall. The only rich soils we saw were in intensive vegetable farms that utilize daily collections of human waste (called "night soils") to fertilize soils immediately adjacent to the major metropolitan areas.

Kobe, Japan

Japan was a financial shock to most of our students. Japan is now one of the most expensive (because of the low value of the U.S. dollar) and wealthy countries in the world. Many of the students felt a bit exploited, a feeling that many of them had never experienced before. Many students expressed the opinion that the wealth of Japan rivals, if not exceeds that of the U.S. today.

The Japanese cities and transportation systems were very clean and efficient. We were also surprised to see little clearcutting of forests on the islands and were told that the Japanese will conserve their forests as long as someone will sell them raw logs and basic forest products "at a reasonable price."

Aboard the S.S. Universe, we had given a series of lectures on the politics and physical impacts of the Hiroshima bomb. Many of our students traveled to Hiroshima to the Peace Park, reporting back very moving accounts of their experiences.

Conclusion

Incremental short-term economic benefits that may accrue from environmental destruction are clearly becoming overshadowed by the global environmental threats. During our voyage, we found strong evidence of climate change, particularly in Europe and the USSR. Throughout much of Asia, the larger cities have become crowded, heavily polluted and impoverished. The impact of five billion humans on the planet is becoming critical from the standpoint of resources, environment, development, and the quality and integrity of human and ecological systems. The denuded hillsides of once great civilizations are a testament to past shortsightedness in resource management; the loaded log trucks from the last great remnants of rainforest, a testament that we haven't yet learned our lessons. The poem "Ozymandias," written in 1815 by Percy Bysshe Shelley, timelessly expressed concern for the role of man in nature:

> I met a traveler from an antique land,
> Who said: Two vast and trunkless legs of stone
> Stand in the desert. Near them, on the sand
> Half sunk, a shattered visage lies, whose frown,
> And wrinkled lip, and sneer of cold command,
> Tell that its sculptor well those passions read,
> Which yet survive stamped in these lifeless things,
> The hand that mocked them, and the heart that fed:
> And on the pedestal these words appear:
> "My name is Ozymandias, King of Kings:
> Look on my works ye Mighty, and despair!"
> Nothing besides remains. Round the decay
> Of that colossal wreck, boundless and bare
> The lone and level sands stretch far away.

Cultural Imperatives in Environmental Policy

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Abstract

Unlike flora and fauna, humans possess self consciousness and cognition allowing a myriad of behavioral responses to a given ecological situation, responses which vary widely across cultures. This paper provides a theoretical framework for understanding such cultural influences and suggests essential roles for humanities and social science disciplines in the policy formulation process.

The Southern Highlands Environmental Project

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Abstract

SHEP educates teachers of grades 5-12 about regional environmental issues and involves students in investigating these issues in their local Appalachian communities. The needs assessments, implementation, and associated research will be presented.

But Bambi Lived in a Balanced Ecosystem

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Abstract

Deer are becoming overpopulated in an increasing number of urban preserves. Management proposals usually include lethal methods, which receive tremendous public outcry. Learn how education has helped an agency deal with this volatile issue.

Bambi lived in a balanced ecosystem. There was plenty of browse for him. Thumper had all the tasty shoots he could handle. Even Flower had lots of variety to choose from. Each day they ate plenty of nourishing food and there was still more. Hunters helped to control the populations. Fire was even a part of Bambi's world. This idyllic scene is not found in most urban areas today.

The Lake County Forest Preserve District (LCFPD) in Illinois owns and manages a 550 acre natural site, the Edward L. Ryerson Conservation Area, in suburban Chicago. Over 330 acres of this site is environmentally high quality land; in fact, it has been designated an Illinois Nature Preserve (a state recognition which gives the land protection by law and also places use restrictions on the property). Over the years development has surrounded the natural area, predators have long since been removed, and gun hunting prohibited. All this has contributed to an unhealthy population growth of the white-tailed deer. An aerial survey, in early 1989, indicated that the site had a minimum of 76 deer. Biologists suggest that 12-15 deer is optimum for an area this size.

As in many other urban natural areas, the Forest Preserve District staff noticed increased deer damage on the preserve. Deer trails wore deeper and wider into the fragile forest floor. Once common spring woodland wildflowers were obviously absent. A browse line allowed visitors to see deep into the woods from the entrance road. The deer signs were so easily recognized that even nonbiologists sensed something was wrong.

Aside from the obvious deer damage, many other species were threatened. There are a total of 95 species of vertebrates that live in Ryerson Woods. Four hundred and sixty-one species of plants have been documented on site. Of this, there are three species of state endangered plants, one of which is a preferred food of the white-tailed deer. The deer threatened veery nests on the ground in the wet areas near the river. In order to nest, the veery needs the same ground cover that is eaten by the deer. There are three species of rare or uncommon amphibians that breed here and rely on the constant high humidity of the forest floor. This, too, was threatened by the browse action of the white-tailed deer.

The LCFPD saw the problem at Ryerson Woods and made it known to the public that they intended to protect all the species that live there. This announcement included the possibility of shooting some of the deer. The LCFPD used education as a tool to inform the general public about the problem and why particular solutions were ultimately selected.

The issue of reducing deer herds has been a volatile one in many parts of the country. Some natural areas have ultimately been destroyed by browsing deer while protection for the property was being sought. Wildlife managers, forced to wait for a compromise, watched prime natural areas be destroyed. The staff involved in the issue at Ryerson Woods was very aware of the problems in other areas. In an effort to give the people of the Chicago area the opportunity to reach informed opinions about this situation, a multifaceted education program was established.

Both formal and informal education took place. The informal education ultimately was more effective because it most often took place on a one-to-one basis.

Two staff naturalists designed a formal education program that introduced the special qualities of Ryerson Woods and the deer population problem. Natural history of white-tailed deer was highlighted. The management options evaluated by the forest preserve staff were listed. Staff reviewed the following options: doing nothing, feeding, fencing the preserve, reintroduction of predators, sterilization for bucks, birth control for does, trapping/relocation and selective shooting. Advantages and disadvantages of each option were discussed. Other solutions were brainstormed with the audience and evaluated by the entire group. The issue was faced head on and all options were talked about, even the most controversial - selective shooting.

The formal education program was given to three special interest audiences. It was strongly recommended that all of the Ryerson Woods volunteers attend one of the "Deer Programs." The staff felt that the volunteer corps' understanding of the situation was critical. A series of programs was set up for the site's support group, The Friends of Ryerson Woods. Finally, programs for the general public were offered.

The naturalists visited several area schools, at the request of the school, to present information about the problem to the students. Possible solutions were discussed but, more importantly, the overall interdependence of the forest community was stressed. The students were never asked to make a decision or form an opinion on the issue. Getting accurate information to the schools was the foremost priority.

As a sidelight, many teachers in the area have used the deer issue as a teaching tool. Many students have contacted district staff to get information for papers or special projects. One teacher used the issue as a lesson in biological literacy. Others introduced environmental ethics by using the deer controversy.

The introduction that each school group receives when coming for a field trip is now modified to address the importance of natural areas. Moreover, the need to properly manage these properties is emphasized.

More informal education began when a law suit was filed to stop the shooting. It was not just a matter of moving the animals or shooting them, it was so much more complicated than that. The media gave the LCFPD the vehicle to tell the whole story. The major television stations, radio stations and newspapers suddenly became a way to educate people.

The Forest Preserve District called several press conferences. One conference showed the variety of species that could be lost if the deer population was not controlled in some way. Another conference gave information on how the trapping process worked and even gave the press an opportunity to watch the processing of a trapped deer. The television stations loved the action aspect of it.

Press releases were sent out regularly during the deer removal, informing the media of the current status of the program. At one point, phone calls from the media were handled almost daily.

The naturalists were constantly answering questions. Walk-in visitors and telephone callers, both sympathetic and hostile, requested information about the deer management. Some of the calls were an hour or more in length. The naturalists tried to give as much time as possible to each inquiry. Most of the people listened intently and had a better understanding of the complexity of the situation at the end of the conversation.

The LCFPD did successfully remove 60 deer (its short term goal) from the property. Both trapping/relocation and selective shooting were used. A birth control research project was initiated this summer.

Many places have not been as open about the management of their urban deer herds as was the LCFPD. It was not always easy to give information about this controversial situation; but, the staff realized that education was an important process that must take place if the common visitor is to understand the care of fragile areas or remnants of a wilder time. The education that was carried on during the initial stages of deer management at the Ryerson Conservation Area was an important step in helping people form solidly based environmental opinions.

Education will be an ongoing part of the deer management program at Ryerson Woods. Volunteers are updated each month in their newsletter. Informational programs are scheduled as part of the general public program offerings. Plans are even under way to do a media blitz before deer removal begins this fall.

Through all the frustrations, stress and joy at saving the forest community, the LCFPD knows that the education process was a very important element of the white-tailed deer management in the Edward L. Ryerson Conservation Area.

Better Air Campaign in Colorado - Environmental Improvement Through Education

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Abstract

The Better Air Campaign seeks to reduce carbon monoxide in Colorado's Front Range communities through a citizen education/information program. Programs like this are of increasing interest to meet public concerns and federal regulations over environmental issues. Pre-sentation includes sources of problem, mitigation strategies, I&E activities, evaluation, funding, associated legislation, sponsors, and future efforts.

The Interpretive Response to the 1988 Yellowstone Fires

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Abstract

During the summer of 1988 wildfires swept across Yellowstone National Park. This workshop will explore what the park's interpretive division's role was during and after these unprecedented fires.

Developing an Undergraduate Course in Conservation/Environmental History

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Abstract

Historical analysis of changes in conservation/environment thinking in the United States provides the framework for a university general education course focusing on perspectives on the relationships between humans and the environment.

A perplexing problem in curriculum development re-emerges each time we attempt to decide how to introduce undergraduate students to an area of study with which they are already somewhat familiar, but in which their comprehension is spotty, disjointed, lacking in perspective, and—across a given class—widely dissimilar. This is certainly true of "environment." Most lower-division (freshman/sophomore) college students know something, perhaps a great deal, about it, but few can effectively interrelate its various facets or demonstrate comprehension of the many interactions demanding knowledge and understanding. This generalization fits students who intend to major in some aspect of "environment" areas as well as those whose professional/career/personal interests are in unrelated disciplines, or are undefined.

The course discussed in this paper employs a historical development approach which interrelates study, particularly readings, in several aspects of "environment" in an attempt to initiate a comprehension of the major conceptual frameworks and disciplinary perspectives necessarily involved in its study. As described here, this approach can serve students intending to major in environmental fields, or (for general education purposes) those whose academic interests are unrelated or undefined. This model has merits worth considering once a decision is made that an introductory "environment" course has a place in a university curriculum—for majors and/or for general education audiences. The argument of appropriateness of such a course, for both audiences, is not made in this paper, but is an underlying assumption.

Because it has a general education function, **Environment: The American Experience** has been designed to provide opportunities for students to develop their skills in expository writing, and in oral discussion and presentation, along with their study of the development of perceptions of the relationships between humans and environment. Interrelated but often contradictory perceptions of "environment" are considered, primarily those of preservationists, conservationists, and environmentalists. Perspectives studied include those of natural, physical, and social scientists, as well as representative aesthetic concerns and ethical positions.

The stated goal of the course is: To explore the historical development of perceptions of the environment in the United States through a study of the lives, achievements, and writings of key figures in the field.

Course objectives specify that, by the course's conclusion, students will:

1) Be able to compare and contrast, orally and in writing, past and present environmental thought in the United States with respect to:

a) environment and preservation;

b) environment and conservation;

c) environment and economic efficiency;

d) environment and science;

e) environment and ethics;

f) environment and natural resources management; and

g) environment and sustainable development.

2) Be able to identify and explain, orally and in writing, current trends in thinking relative to environment as they are related to the thinking of the past; and

3) Be able to project, orally and in writing, potential effects of current understanding and perceptions of the environment to future practice in the conservation and management of natural resources and environment.

The course outline is chronological, and provides introductory exposure to (but far from in-depth consideration of) the major ideas associated with "conservation," "preservation," and "development," with emphasis on their interdependence. As designed for a quarter system (five one-hour class meetings per week, for ten weeks), the following outline has been developed:

Week One:
Introduction—Old World Backgrounds and Expectations; The Europeans, Adventurers and Colonists; Native American Conservation Philosophies; New World Encounters Agrarian Societies - the South, the North.

Week Two:
The American Frontier—Manifest Destiny; The Cornucopia?

Week Three:
Conceptualizations of the Natural World: Deists, Primitivists, Transcendentalists, Naturalists, Natural Scientists—Mark Catesby, The Bartrams, Thomas Jefferson, Ralph Waldo Emerson, Henry David Thoreau, Alexander Wilson, John James Audubon, Louis Agassiz, Mary Austin, John Burroughs.

Week Four:

Pioneers in Conservation/Environmental Thought—George Catlin, George Perkins Marsh, Carl Schurz, Frederick Law Olmsted, John Wesley Powell.

Week Five:

Preservation or Conservation? Gifford Pinchot, W. J. McGee, Theodore Roosevelt, John Muir, Robert Underwood Johnson, Robert Marshall, Stephen Mather, Horace Albright, J. N. Darling, Hugh Hammond Bennett.

Week Six:

Environment, Economic Efficiency, and Politics between the Wars—The 1920s, boom to depression; The 1930s—FDR, The New Deal, the Alphabet Agencies; TVA-Arthur Morgan, Harcourt Morgan, David Lilienthal.

Week Seven:

WW II toward the Present: Environment and Science—Harrison Brown, Garrett Hardin, the Ehrlichs, the Odums.

Week Eight:

Conservation/Environment/Ethics—Aldo Leopold, Lynn White Jr., etc.

Week Nine:

Environmental Movements, 1960s/70s/80s: Earth Day to "Deep Ecology"—Rachel Carson, David Brower, Barry Commoner, etc.

Week Ten:

The Futurists, Past and Present—The Neo-Malthusians, The Anti-Malthusians, The Global 2000 Report; The Concept of Sustainable Development.

A basic reference for all students is Nash's (1976) The American Environment: Readings in the History of Conservation; it is a convenient source of many key readings, and provides concise, insightful commentary. Additional required texts are Fox's (1985) and Petulla's (1988) environmental histories, two "modern" treatments which effectively complement one another. All students are required to read, and discuss in historic and philosophic context, two "environmental classics"—Leopold's (1949) A Sand County Almanac and Carson's (1962) Silent Spring.

An extensive reading list is provided for use in preparing required papers. Included are a number of other "environmental classics." The list has become a "starter" recreational/professional reading list for many students; to indicate its breadth and structure, its first page is reproduced below as Appendix A.

Student writing activities include in-class essays and more extensive out-of-class papers. For in-class writing assignments, topics consistent with the course outline emphasize analysis of information presented in class and in weekly reading assignments; these are open-book exercises. Out-of-class papers additionally necessitate delving into the reading list to support analysis and synthesis of key ideas, particularly including diverse perspectives on and perceptions of "environment." Students are "...expected to produce writing characterized by a clear sense of purpose, effectively ordered and fully supported ideas, style appropriate to purpose and audience, and control of grammatical and mechanical elements," as specified by The Ohio State University's guidelines for general education writing courses. They are also expected to revise their written work, following the instructor's critique. These guided revisions are targeted toward development and demonstration of understanding, not solely to mechanical/grammatical considerations.

It is impossible to provide background sufficient to mature understanding of the environment in one course at any level, and attempts to do so are ultimately unsatisfactory both to students and to instructors. It is, however, a reasonable expectation that students can begin to comprehend its dimensions in an introductory course if the course is well-designed, effectively implemented, and sufficiently demanding so that students will define in their own minds the scopes of environmental considerations and initiate their personal confrontation of key issues. A historical approach which explores the development of environmental thought is capable of producing such a result.

Required Readings

Rachel Carson. 1962. Silent Spring. Boston: Houghton-Mifflin.

Stephen Fox. 1985. The American Conservation Movement: John Muir and His Legacy. Madison: University of Wisconsin Press.

Aldo Leopold. 1949. A Sand County Almanac and Sketches Here and There. New York: Oxford University Press.

Roderick Nash, ed. 1976. The American Environment: Readings in the History of Conservation, 2nd ed. Reading, MA: Addison-Wesley.

Joseph M. Petulla. 1988. American Environmental History: The Exploitation and Conservation of Natural Resources, 2nd ed. Columbus: Merrill.

Appendix A: Selected Readings (as a specimen, the first page of a seven-page list).

Edward Abbey. 1968. Desert Solitaire: A Season in the Wilderness. New York: McGraw-Hill.

Horace M. Albright and Robert Cahn. 1985. The Birth of the National Park Service: The Founding Years, 1913-1933. Salt Lake City: Howe Brothers.

Durward Allen. 1962. Our Wildlife Legacy, revised. New York: Funk & Wagnalls.

Tom Arrandale. 1983. The Battle for Natural Resources. Washington, DC: Congressional Quarterly Inc.

Mary Austin. 1909. The Land of Little Rain. Boston: Houghton. Reprinted 1962 by Natural History Press.

Kendall E. Bailes, editor. 1985. Environmental History: Critical Issues in Comparative Perspective. Lanham, MD: University Press of America.

Harold J. Barnett and Chandler Morse. 1963. Scarcity and Growth: The Economics of Natural Resource Availability. Baltimore: Johns Hopkins University Press.

Gerald O. Barney, ed. 1980. The Global 2000 Report to the President: Entering the Twenty-First Century. Washington: United States Government Printing Office.

William Bartram. 1791. Travels of William Bartram. Reprinted 1955 by Dover Publications.

Hugh Hammond Bennett. 1939. Soil Conservation. New York: McGraw-Hill.

Public Education and Environmental Activism: Creating Opportunities for Involvement

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Abstract

The presentation concerns efforts to increase involvement in environmental issues by students at a major public university. Discussion focuses on a program in which students work one-on-one with faculty members on an issue of mutual concern, earning academic credit for work done in the community.

This paper concerns our efforts to promote environmental activism among students at the University of California, Irvine (UCI). The rationale upon which our efforts are based is presented, followed by an outline of the programmatic approach we are initiating to increase student involvement. We conclude by discussing steps taken to date and issues raised in the process.

Rationale

There are many environmental problems. Their resolution will require the cooperative actions of many people. Yet sheer numbers of environmental activists cannot alone suffice. Without guidance, much of their energy is wasted, or exacerbates other problems. Although the importance of an emotional basis for action should not be underestimated, it is at least equally important that action be guided by sound understanding of the given problem and its context. Such understanding is the product of education. Education is socially sanctioned because of the cultural awareness that benefits accrue to society from an educated citizenry. Further, public education is subsidized because benefits are expected. Some benefits are realized in terms of maintenance and enhancement of environmental quality. In sum, preparation of people for participation in environmental issues is an appropriate assignment for our public educational institutions.

Approach

Environmental educators are challenged to not only prepare students for participation, but to also create an educational context in which students can direct their knowledge toward practical ends. In our efforts to promote activism at UCI, we started from the assumption that environmentally responsible behavior would best be engendered by some form of program that would have both academic and non-academic elements.

Recognition of the value of such an approach has come from California's legislature. In 1987 the State Assembly instituted a program called the Human Corps in the University of California and California State University systems. In enacting the legislation, the Assembly stated the following intentions:

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1) Complete the college experience by providing students an opportunity to develop themselves and their skills in real-world learning experiences.

2) ...help nurture a sense of human community and social responsibility in our college students.

3) Invite the fullest possible cooperation between postsecondary education institutions, schools, public, private, and non-profit agencies, and philanthropies to plan, fund, and implement expanded opportunities for student participation in community life through public service in organized programs.

4) ...substantially increase college student participation in community services by June 20, 1993, with the ultimate goal of 100% participation (A.B. 1820, 27 September, 1987, Section 99100).

The Assembly based its action on a rationale that cited unaddressed social needs and environmental problems, the need for creative and cost-effective solutions to those problems, and the public service mission of the State's postsecondary educational institutions. The program we are working to implement is consistent with the letter and spirit of the Human Corps legislation.

The first problem faced concerns bringing students into the program. From our perspective, one of the most significant characteristics of UCI students is their tendency toward non-involvement. When first looking at ways to increase student participation in environmental issues, one question asked was, "Why aren't they already involved?" The best answer seemed to be that they feel they are too busy. With demanding courses and 10-week quarters in which to complete them, students work at a fevered pace just to stay "caught up." Giving time to work on environmental problems might mean sacrificing time needed for studies. We understand this concern. Plainly, students choosing to become more involved might be penalized in terms of progress toward other goals. A program intended to increase student involvement should also help them move toward their academic goals. For this reason, course credit is a basic element of the program we envision.

Because of formal and de facto restrictions on participation and the kind of academic credit that can be earned, existing programs are often limited in the extent to which they can encourage student involvement. We want a program open to all students, but offered through individual academic units. Although some units may feel that the program would not be in keeping with the content of their more traditional academic offerings, such a feeling merely belies an unexercised imagination. For example, drama students might welcome the opportunity to engage in street theater with an environmental message. In addition, the credit offered should be equivalent in kind and amount to that offered for participation in formal upper-division courses requiring similar effort. These arrangements would facilitate the direct application of credit earned to requirements associated with the given major. This would, in turn, encourage involvement by making more clear the connection between service activity and academic progress.

To publicize the program, it should be advertised in the campus general catalogue. A description should be provided, along with details of what the student must do to take advantage of the opportunity. This information, or at least some subset of it, should be included in the descriptions of the individual academic units.

Students would be responsible for doing three things at the outset. First, they must consider their degree requirements, present standing with respect to the fulfillment of those requirements, and the way in which participation in the program would help fulfill those which remain. In effect, they must assess the fit between participation in the program and other scholastic demands. Second, students must develop an action plan consisting of a brief description of the problem and the activity in which they will be engaged. In describing the activity, they should indicate the amount of time they intend to work on the problem and the amount of academic credit desired. They should also indicate whether they intend to work independently or with an established organization. Finally, students must find a faculty sponsor affiliated with the academic unit offering their major. The sponsor's affiliation is important with regard to ease of application of credits earned to requirements of the student's major.

Although the emphasis should be on the work conducted outside the academic structure, the academic component should not be neglected. Just as the form of activity should be worked out with the sponsor at the outset, so should the academic component. This should include a reading list and some means of reporting on the activity. Whatever is agreed upon with respect to reading and reporting should be subordinate to the activity component. The academic element should focus upon understanding the problem at hand, so that the field activity is not without guidance.

Admittedly, this is a sketchy outline of the program. Nonetheless, fundamental elements of curricular structure, promotional strategies, and student responsibility have been delineated. Discussion has been in general terms, and reflects our need for flexibility in the initial stages of implementation. The ideas presented form a conceptual foundation for our effort.

Conclusion

To date, our efforts have been limited to working with a few students on a pilot basis and to information gathering, which has proceeded on three fronts. During spring of 1988 we surveyed 697 undergraduates to assess knowledge of and involvement in environmental issues, as well as interest in increasing involvement, particularly within the context of our program. We found interest to be substantial. We then surveyed all faculty on complementary matters. Response was weak; however, we were able to develop a list of nearly 50 faculty willing to work with students on issues of mutual concern. We are presently contacting local environmental organizations to assess their interest in the program. This will also contribute to a directory of issues and contacts for use by students looking for placements.

The proposed program will not be implemented on a formal basis without some administrative review. Matters of resources and curriculum development will need to be addressed in greater detail. Although problems will arise that have not been anticipated, we have been able to identify two fundamental issues.

The concept of offering course credit to increase involvement has sparked some discussion. Some view it as a modified form of bribery. Rather than try to deny this contention, we would emphasize that it can often be difficult to get students involved...and keep them involved. Aside from trying to reduce penalties that involvement may impose on academic progress, we are coming to grips with apathy, a force not unlike gravity in its ability to pull things to the ground. Students not previously involved may not be aware of the intrinsic rewards to be gained from participation, and so may be less motivated to become involved. Students attracted to the program by the credit opportunity may come to appreciate the intrinsic rewards, and so be motivated to maintain involvement over the long term.

A related issue is "having to choose" between academics and activism. Although we understand students' concerns about not having time, we are sympathetic only to a point. Individual achievement has a context that cannot be neglected without some cost being incurred. A t-shirt cartoon seen in passing makes the point succinctly: "Nuclear war! There goes my career!" Our hope is that students will become aware of the need for congruence between the attainment of personal goals and the fulfillment of social and environmental responsibilities.

An Environmental Issues Course in a College Liberal Arts Core Curriculum: A Ten Year Review

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Abstract

In 1979 Southern Vermont College added a course dealing with environmental issues to its liberal arts core curriculum. This presentation covers the response to the course and the changes in attitudes and behavior of students that resulted.

The premise is that an environmental awareness course belongs in the liberal arts requirements of all institutions of higher education.

At Southern Vermont College a course, titled **Living in the Environment,** has been a liberal arts core requirement for the past ten years. Each semester the learning that has occurred that semester is evaluated. This spring a survey of graduates was carried out to determine the long-term impact. The results of that survey indicated that the course had a positive long-term impact on the lives of graduates.

The objectives of the course, as given in the course syllabus, show the expected learning. This course has been designed to help students understand:

1) the environmental problems associated with air, water, pollution, resource depletion, acid rain, solid and hazardous waste, global warming, endangered species, land use, and energy;

2) how these problems are related to their present and future lives;

3) the basis for the study of environmental problems, ecology;

4) the change that continually takes place in ecosystems;

5) that a global perspective is necessary for the study of these problems; and

6) that this learning is a beginning that leads to a life-long pursuit of information and understanding of the world in which we live.

These objectives have remained the same throughout the existence of the course. The emphasis may change from semester to semester as major environmental issues appear. For example, spring semester of 1989 the oil spill at Valdez offered an opportunity to demonstrate the global character and the complexity of environmental issues; and on the local scale, the solid waste crisis in Bennington, Vermont, the town in which Southern Vermont College is located, offered an opportunity not only to find out about a local problem, but also to participate in its resolution.

History of the Course

In 1975 an environmental awareness course provided an introduction to environmental issues to students in the Environmental Studies Program at Southern Vermont College. Three years later during the process of curriculum development not only within the program, but also in the newly designed liberal arts core curriculum, this environmental awareness course was accepted by the Faculty Forum as an appropriate course for inclusion in the liberal arts requirements for all students. The course contained elements of the natural sciences, the social sciences and the humanities.

However, when this decision was implemented and the course became a requirement, there was a lack of enthusiasm among the students for the liberal arts requirements, and in particular, any course with an element of natural science. This course has as its base an introduction to ecology, so there was general uneasiness because of this new requirement. With the passage of time, the course has acquired a reputation among students as demanding yet interesting and important for their future lives. The standard semester evaluations bear this out.

An on-going evaluation occurs in two forms each semester. One is the evaluation of all courses by a standardized evaluation form, and the other method is unique to this course. In the latter case, at the beginning of the semester, students are required to write a paragraph or so covering their understanding of environmental issues. These papers are collected and stored. At the end of the course, these papers are returned to the students and they are requested to write about their current understanding of environmental issues. These writings are reviewed and used to evaluate the success of the course that semester.

One of the objectives of the course is to develop life-long learning patterns in students. The semester evaluations do not provide a means of determining if this is happening. Therefore, a method for determining the impact of the course on the students after leaving Southern Vermont College was needed. The method chosen was a survey of graduates of the college since 1979. The purpose of the survey was to determine the attitudes of graduates before and after completing the course, global awareness, the kinds of environmental problems the graduates face at work and at home; to see if the course had helped them deal with these problems; to find out the extent of their awareness of today's environmental problems; and lastly to determine the current involvement of students in environmental action. The results of this survey are the major concerns of this paper.

Survey

The development of the survey began with a search for a suitable list of graduates. The Development Office of the College provided a computer generated list of all the graduates that had been in contact with the Development Office recently and that had graduated from 1979 to the present. This list contained 300 names. It was decided to survey 100 graduates selected randomly from this list. The graduates had three weeks to respond to this survey. There were twenty-three responses, 23% of the number sent out, or 7.6% of the graduates on the list. It was fortunate that those graduates randomly selected represented all academic programs offered at the College.

The breakdown of the respondees by program follows:

Program	Number of Respondees
Accounting	3
Business Management	2
Communications	1
Criminal Justice	1
English	1
Environmental Studies	6
Health Services	3
Human Services	3
Office Management	1
Social Work	2
Total	23

More environmental studies graduates responded than graduates of other programs. This can perhaps be explained by their greater interest because of their work and background. However, because these graduates represented 26% of the respondees, it was decided to report the results in three groups, and to compare these groups one with another. The groups were:

1) total responses
2) environmental studies responses
3) other program responses

A check of the master list showed that only six environmental studies students had been on that list. There was, therefore, a 100% response from that group.

Survey Results

Questions 1 and 2 were answered as follows:

1) Did you look forward to taking the course, Living in the Environment?

Chart I

	Total Response	ES Response	Other Response
YES	73%	100%	65%
NO	26%	—	35%

2) Did you develop an interest in the course?

Chart II

	Total Response	ES Response	Other Response
YES	96%	100%	94%
NO	4%	—	6%

This response indicates that even though 26% of the total respondees did not look forward to taking the course that all but one of them developed an interest in it.

The third question supplied a list of environmental issues and asked if the respondees had developed a continuing interest in these issues. The results follow:

3) Are you informed about? (check all that apply)

Chart III

Issue	Total	ES	Other
Population growth	65%	83%	59%
Ecosystems	70%	83%	59%
Nuclear power	39%	50%	35%
Solar power	48%	100%	29%
Other energy	52%	83%	41%
World hunger	48%	50%	47%
Natural resources	70%	100%	59%
Solid Waste	48%	83%	35%
Hazardous waste	65%	83%	59%
Human health	48%	17%	59%
Housing	39%	17%	47%
Land resources	78%	100%	71%

Water resources	70%	100%	59%
Endangered species	61%	83%	53%
Planning & zoning	52%	67%	47%
Air pollution	78%	100%	70%
Water pollution	87%	100%	82%
Environmental law	48%	83%	35%
Environmental ethics	52%	100%	35%

The greatest amount of continuing interest was in water pollution, land resources, and air pollution. These were followed closely by ecosystem relationships, population growth, natural resource depletion, hazardous waste, and human health. The environmental studies graduates showed great interest in solar power, other energy, solid waste, endangered species, environmental law and environmental ethics as well as in the issues selected by the other groups. The least significant in both groups were nuclear power and world hunger. The environmental studies group was lower than the others in indicating human health.

Question four referred to global awareness and the response was 100% yes, indicating that the graduates do continue to have a global perception of environmental issues.

5) In your work, are you confronted with problems in... (check all that apply):

Chart IV
Yes Responses

Issue	Total	ES	Other
Air pollution	39%	50%	35%
Water pollution	35%	50%	29%
Energy	30%	38%	29%
Solid waste	35%	50%	29%
Hazardous waste	39%	50%	35%
Human health	48%	50%	47%
Land resources	39%	50%	24%
Other nat. res.	17%	39%	12%

Human health was the most often noted with air pollution and hazardous waste following, then water pollution and solid waste. The environmental studies graduates also selected land resources. The other responses offered issues relating to asbestos, drought, hunger, recycling, and illegal disposal of waste.

6) In your personal life, are you confronted with problems in... (check all that apply)

Chart V
Yes Responses

Issue	Total	ES	Other
Air pollution	48%	33%	53%
Water pollution	52%	67%	47%
Energy	43%	17%	53%
Solid waste	39%	50%	35%
Hazardous waste	30%	50%	24%
Human health	70%	50%	76%
Land resources	39%	67%	29%
Population growth	39%	17%	47%
Zoning	57%	67%	53%

Zoning and human health issues were the ones most often encountered. The environmental studies graduates found more issues around water pollution, solid waste, hazardous waste, and land resources. While the others found air pollution and energy issues to be at the next level of significance.

7) Has the course, Living in the Environment, helped you deal with these problems?

Chart VI

	Total Response	ES Response	Other Response
YES	96%	100%	94%
NO	4%	—	6%

Again, one person provided a negative answer.

8) Are you informed about... (check all that apply)

Chart VII
Yes Responses

Issue	Total	ES	Other
Alaskan oil spill	100%	100%	100%
Oil drilling on the Arctic coastal plain	65%	100%	53%
Tropical rain forests	100%	100%	100%
Garbage on beaches	96%	100%	94%

Land fill sites	**91%**	**100%**	**88%**
Agricultural land	**87%**	**100%**	**82%**
Plight of the condor	**65%**	**67%**	**65%**
Hunger in Africa	**87%**	**100%**	**82%**
Homelessness in U.S.	**96%**	**100%**	**82%**
Acid rain	**91%**	**100%**	**88%**
Red wolf introduction	**22%**	**50%**	**15%**

The most widely recognized were the Alaskan oil spill, the depletion of tropical rain forests, garbage on the beach, and homelessness in the United States. The introduction of the red wolf was the least known in all groups.

Questions nine and ten were directed toward involvement in environmental concerns. Question nine asked if the graduates recycled.

Chart VIII

	Total Response	ES Response	Other Response
YES	78%	100%	71%
NO	22%	—	29%

Question ten asked if the graduates belonged to any environmental action groups whether local or national.

Chart IX

	Total Response	ES Response	Other Response
YES	26%	33%	24%
NO	74%	67%	76%

Recycling appears to be another demonstration of the impact of the course, but membership in an activist group does not appear to be at all widespread. This was a disappointment. Two students belong to Green Peace, one to an arts foundation, and two to unidentified groups.

Comments

Although comments were not solicited, some were contributed. Some were personal notes to me. The following four comments are from students that graduated from programs other than environmental studies.

1) This course was the biggest eye opener for me and has had a lasting impact on my life...I believe every student should be exposed to this body of knowledge. This course was one of the best courses I ever took at Southwestern Vermont College, and I never would have taken it were it not required.

2) As one goes along, it becomes more and more evident that environmental concerns are not limited by political boundaries, but rather that problems of the environment require regional, state, and federal solutions.

3) I am currently involved in putting together an exhibit on homelessness in New York city.

4) This course has helped me explain and teach around most of these issues. While in Samoa, I was able to tell the children in my class about the global effects of chlorine fishing, dynamiting reef areas for fish, and also about the effects of over-hunting fruit bats on not only their banana crops, but also on the prices of fruit in other parts of the world.

Summation

Although the response was limited, the results of the survey show that:

1) All but one student developed an interest in the course while an undergraduate.

2) Many of the students continue to be interested in the environmental issues that are a part of the course.

3) The environmental issues confronted at home or at work were limited by job and location.

4) All but one graduate indicated that the course helped him or her deal with these problems.

5) Generally the graduates appear to be well informed about environmental issues.

6) Recycling is practiced by most of the graduates.

7) It should be noted that several of the environmental issues used in this survey were not a part of the course in earlier years because they had not become apparent. Environmentally-aware graduates would be expected to have expanded their information and understanding to include these issues.

The results appear to confirm that objective six of the syllabus is being met.

Environmental Scanning and Policymaking

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Abstract

Environmental or issue scanning is a technique in strategic planning. Scanning is being used in Kentucky to identify emerging policy issues for legislators and to network with universities. This process is particularly applicable to environmental issues.

Can a more long term perspective be incorporated into government decision making? Elected officials are, by necessity, concerned about immediate problems, and the need to show immediate or concrete results. This often puts long-term considerations at a disadvantage. Because environmental protection benefits are hard to measure and the negative impact of delaying them is often not immediately obvious, environmental considerations have often been neglected.

However, the value of a more long range perspective on issues is being recognized in policymaking circles. Several federal agencies are involved in long range planning. They include the U. S. Treasury, the General Accounting Office, the U. S. Forest Service, and the U. S. Bureau of Census. Congress has established the Congressional Clearinghouse on the Future to help explore "the policy implications of emerging demographic, technological and economic trends" (Congressional Yellow Book 1989). Blueprint for the Environment (1988), a document prepared by a coalition of environmental groups to advise the President-Elect, calls for a government-wide foresight process to consider long-term, international and cross-cutting effects of decisions.

Several states have initiated programs to bring a more long-term perspective into their decision-making. The effort in Florida, known as Florida Sunrise, and the Florida Strategic Agenda Setting Process are two such legislative undertakings (Speakers Advisory Committee on the Future 1987; Strategic Agenda Setting Process 1989). New Horizons in Nebraska is a broad-based grass roots approach to goal setting for a state (Armstrong 1988).

The Kentucky Legislative Research Commission (LRC) has initiated a program to look at ways of assisting the legislature to take a more long-term look at issues. This was done by adapting the concept of environmental or issue scanning, used in strategic planning in the private sector, to the legislative organization. The Council of State Policy and Planning Agencies

(CSPA) has a national scanning operation that it uses to identify emerging issues for the Governors. Scanning operations are conducted in the executive branch in several states including Minnesota, Ohio, Connecticut, Iowa, New Jersey, Oklahoma, North Dakota, and Pennsylvania. With the help of CSPA this process was adapted for legislative branch use. In Kentucky, a by-product of this more long-term view has been to make some environmental issues much more visible and pertinent to legislators.

Before discussing the Kentucky program, there is a need to define the process of scanning and the organizational structure of the Kentucky Legislative Research Commission.

Scanning Defined

Scanning is "the practice of searching a wide array of information sources on a regular basis for symptoms of change or shifts in the cultural, institutional, economic and physical environment that may affect the organization" (Cook 1986). Scanning gets its name from the fact that it "serves as a kind of radar, spotting emerging issues when they are but weak signals of change and tracking them as they evolve and become more clearly defined" (Cook 1988). Scanning is often referred to as "environmental scanning" or "issue scanning." "Environmental" here is used in its broadest sense, referring to any factor outside of the organization that influences the operation of that organization whether it be cultural, institutional, economic, or physical.

Scanning is based on the concept that issues follow cycles (Schon 1971). Generally, issues do not arise overnight as full blown crises. There are previous indicators. By regularly reading a set of journals and other publications one can begin to pick up on new or emerging issues before they become crises. Likewise, one can position oneself to be ready to take advantage of new initiatives, shifts in trends or innovative proposals that might be coming along. For decision makers, any ability to increase the lead time for addressing issues is worthwhile.

Kentucky LRC: Organizational Structure

The organization of the staff of the Legislative Research Commission lends itself well to a scanning operation. The Commission is a 16 member board composed of the majority and minority leadership from the House of Representatives and the Senate. An Executive Director serves at the pleasure of the Commission. The Director, in turn, hires a staff to perform the research and bill preparation work for the General Assembly. Staff is organized by issue areas based on the committee structure of the legislature. The current interim joint committees are: Agriculture and Natural Resources, Appropriations and Revenue, Banking and Insurance, Business Organizations and Professions, Cities, Counties and Special Districts, Economic Development and Tourism, Education, Elections and Constitutional Amendments, Energy, Health and Welfare, Judiciary, Labor and Industry, Small Business, State Government, and Transportation. Staff assigned to these committees generally hold graduate degrees related to the issue area. They are responsible for staffing committees, doing research, and drafting bills. They do a substantial amount of reading in order to keep up with developments in their respective fields.

The LRC Scanning Program

In August of 1988 committee staff were invited to participate in a formal scanning program. About 30 professional staff volunteered to do so and were given a brief training session on scanning. Basically, they agreed to be readers or "scanners," that is, they would, as they went about their normal reading, flag articles that appear to indicate a new idea, an emerging issue, a shift in trends, or a novel approach to a problem. They complete a brief form adapted from the national scanning operation of the Council of State Policy and Planning Agencies. This form requires a brief summary of the relevant parts of the article and a short analysis of what the implications are for Kentucky. Generally, 12 to 20 "scans" are generated monthly. Once a month all of the scanners meet to review these scans and to select those that appear to have the most significance for the state and ones the General Assembly can address. A modified nominal group technique is used in the selection process (Delbecq and Van de Ven 1971; Nutt and Backoff 1987). This involves ranking of the scans by each scanner individually, group discussion of the scans considered to be most significant by each scanner, and voting to arrive at a group priority list. The top priority issues are then summarized in a monthly newsletter that goes to about 500 persons and organizations including legislators, executive agencies, universities and colleges, business and civic groups, and the press.

In addition to the in-house scanners, the head of every executive agency and every university and college in the state was asked to designate a contact person to periodically send to the LRC publications generated by that agency or institution that relate to public policy. This was an attempt to broaden the scanning horizons and also to serve as a "broker" to relay public research information to legislators in a newsletter format that would be most useful to them.

Environmental Implications

Between October, 1988 and May, 1989 eighty articles appeared in the newsletter. One fourth of them dealt specifically with environmental issues. They included: indoor air pollution, water marketing, competitive solar energy, EPA's ranking of the seriousness of environmental problems, the greenhouse effect, new technologies to handle nitrogen oxide emissions and to clean toxic substances from soil, water pollution from agriculture, and the pros and cons of biodegradable plastics. Most of the environmental issues were ones not being specifically addressed by the legislative committees because of their more long range implications. Through the newsletter, however, legislators were, at least, made aware of the major points being raised by experts on these topics.

The Next Step

The goal is to go beyond awareness and bring a more long term perspective to the decision making level. The first decision making level in the Kentucky legislature occurs with the committees. Plans are to prepare a document on an annual basis for the Legislative Research Commission. This document will contain the most significant issues or trends identified by the scanning operation over the last year. It will contain a statement about the current status of Kentucky in regard to these issues or trends and future implications for the Commonwealth. The Commission, in turn, will be requested to refer trends and issues to the appropriate interim joint committees for further study.

It is hoped that this process will eventually bring a more long-term perspective to committee work and, thus, policy development by the Kentucky General Assembly. A side effect will be making environmental issues with long-term implications more relevant to current decision making. Another side effect may be a more effective mechanism for funnelling the results of university research directly into the decision making process. Because of the newness of the program, the degree to which these goals will actually be achieved must await the test of time.

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Comparative Scenarios for Coastal Land Use Based on Alternative World Views

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Abstract

Compatibility of land use on Delaware's barrier beaches with design criteria derived from the dominant Western world view and bioregional world view was examined along with implications of land use based on each of these world views.

Background

The complex problems of coastal barrier development and the partial failure of institutional policies to prevent further costly degradation of barrier beaches suggest a need for another approach to coastal management. A bioregional world view offers an alternative ethic for making decisions about the use of barrier beaches. **Bioregionalism** is a philosophical paradigm and a lifestyle based on the concept of bioregions—defined as geographic areas distinguishable by their natural features (e.g., landforms, climate, flora and fauna) and by the indigenous cultures and types of human settlement that have risen out of the unique combination of these natural features (Dodge 1981; Berg 1983; Haenke 1984; Sale 1985).

It is instructive to compare design criteria that can be drawn out of the industrial-scientific world view (i.e., dominant Western paradigm) and a bioregional world view to guide decisions about human use of barrier beaches. Scenarios can then be created to study long-term implications of using barrier beaches in a manner consistent with each world view.

Research Problem

The problem addressed by this study was to determine what uses of Delaware barrier beaches are compatible with decision-making criteria derived from a bioregional world view and the industrial-scientific world view, and, secondly, to consider potential long-term implications of barrier beach use based on these two world views.

Methods

To determine tenets of each world view, the content of articles about the industrial-scientific world view and a bioregional world view were analyzed. The two paradigms, for the purpose of this study, were compiled from the most frequently appearing tenets in the literature.

A set of design criteria for each world view was developed by reviewing more than 50 articles on ecology, coastal management, appropriate technology and bioregionalism. Drawing on statements in the literature, criteria were written based on logical connections to at least two tenets of a world view and relevance to the question of barrier beach land use.

Current land use in the study area was documented by field reconnaissance between December 1987 and February 1988, augmented by aerial photos taken in October 1987, government planning documents, USGS maps, and the USDA soil survey. A qualitative evaluation of the compatibility of current land use in the study area with each design criterion was made based on information gathered during the field study along with information from planning documents and scientific literature.

A scenario corresponding to each world view was written for the future of land use in the study area during the next 25 years. The Industrial-Scientific Scenario was based on the premise that all land use decisions within the study area during the next 25 years will be consistent with the industrial-scientific world view. The Bioregional Scenario made the same assumption about land use consistency with a bioregional paradigm. The scenarios were written using a method that combined procedures developed by Becker (1983) and Kurtzman (1984).

Results

The content analysis revealed the following tenets of the two world views: 1) **Industrial-scientific paradigm:** domination of nature, competition, dependence on experts and specialists, economic growth, nature as a resource, centralization, confidence in science and technology, and materialism; and 2) **bioregional paradigm:** biocentrism, cooperative economics, self-determination, sustainable society, ecological awareness, decentralization, appropriate technology, and diversity.

The industrial-scientific design criteria emphasize centralized land use planning, technological solutions (e.g., coastal engineering), maximization of economic productivity, macro-scale buildings and systems, siting of buildings based on beach access and views, highly capital-intensive use of barrier beaches, market forces, and economic growth. In contrast, the **bioregional design criteria** stress ecological and social sustainability, carrying capacity, designing with nature, environmental education, appropriate technical means, public participation and self-governance, planned retreat from barrier beaches, diversity in transportation, and small or cooperative businesses.

Land use on the Delaware coast is currently dominated by recreational day-use areas that cover approximately 60% of the study area's 24-mile oceanfront. Residential areas composed of single-family homes make up approximately 29% of the oceanfront, 10% is commercial, and less than 2% is undeveloped.

Commercial development in the study area is generally in accord with the industrial-scientific design criteria. However, the residential and state park recreational areas that collectively comprise 89% of the shorefront are not compatible with the industrial-scientific paradigm because they do not represent the maximization of economic productivity through the free play of market forces.

Use of the state park lands is mainly compatible with the bioregional design criteria. The commercial and residential lands are incompatible with bioregional criteria because of inappropriate siting, design and construction of buildings and use of coastal engineering structures.

The **Industrial-Scientific Scenario** depicts significant economic growth in the study area as the Delaware barrier beaches become major year-round resorts. Zoning regulations are loosened, condominiums and retail businesses replace houses, private development is allowed in the state parks, and the beaches are further armored with coastal engineering structures. By 2013 the study area is much more intensively developed than today, and economic growth is achieved at the cost of degraded environmental quality and loss of the area's "quiet resort" aesthetics.

In the **Bioregional Scenario,** economic growth is slower, while environmental quality considerations and long-term sustainability are given priority over short-term tourism revenues. This scenario includes diversified transportation, the start of a planned retreat from flood-prone areas, the establishment of cooperative businesses to market regional products, and the creation of self-governing bioregional councils.

Conclusions

The current land use pattern in the study area, and the probable course of future development is **in between the extremes** portrayed by the bioregional and industrial-scientific world views. This intermediate type of development, partly compatible and partly incompatible with each world view, is a balance of real-world forces including the contrasting goals of short-term economic growth and long-term ecological sustainability.

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Environmental Science in University General Education Programs

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Abstract

We need to work together to fashion an effective strategy whereby environmental education becomes part of the general education of all college and university students. Environmental science courses should be made part of the general education of all college and university students. The most compelling reason for this is that we have serious environmental problems certain to continue to require the attention of educated people in all walks of life. This reason alone will not be compelling enough, however, because it is unlikely to overcome the tendency on the part of university faculty to view the general education curriculum as a mosaic made up of exclusive bits of well-defined turf. Because environmental science is science based and because environmental issues touch on virtually all disciplines,

environmental science can also address other important objectives of general education, namely: illuminating science in its connection to the real world and giving students practice grappling with genuine issues from the perspectives of multiple disciplines. By devising strategies whereby environmental science can be shown to help accomplish these and other general education objectives, and by finding ways to involve faculty from a wide variety of disciplines in the design and delivery of environmental course experiences, perhaps we can make environmental education inevitable for all college and university graduates.

Prospects for solving many of our most important environmental problems are not good. Some are global problems whose solutions will require unprecedented international cooperation. All of them are complex problems whose solutions will require people able to grasp the big picture, people able to deal with complex problems, and people able to support long-term strategies. We don't have many of these kinds of people: our universities aren't turning them out anymore, if indeed they ever did.

Much has been written lamenting the fact that college and university curricula no longer generate "educated" people. As Ernest Boyer put it in his book (1987), "This nation and the world need well-informed, inquisitive, open-minded young people.....educated men and women who not only pursue their own personal interests but are also prepared to fulfill their social and civic obligations," implying that our colleges fail to generate them. This has serious implications for the environment.

A sequence of events on our campus recently provided a striking illustration of the nature of the problem. A general education program that has served us well for a time seemed to have gotten out of hand. The number of course alternatives had grown, and the distinctions between courses designed to generally educate and those designed to serve as foundation courses for particular majors had blurred. A task group was appointed; and when its proposed new program came out in first draft, it had a course called Planet Earth. Planet Earth was to be a required course designed to achieve the important general education objective of showing the relationship of humankind to the environment. Campus-wide reaction to the proposal was distilled and a second draft was generated. Somewhere along the way, Planet Earth was deleted.

It was suggested that some faculty feared that Planet Earth would be too "watered down" and not have enough substance. There was some concern about who would teach it. The idea that such a course could be team taught was thought by some to be unworkable. Apparently the environment was perceived as too big to be dealt with by any one academic specialty, too broad to be deep enough, and too complicated to be dealt with by groups of different kinds of specialists. Perhaps our world is in trouble for some of the same kind of reasoning. Environmental problems are too global to be dealt with by any one country, too complex to be tackled by any single kind of specialist, too important to be left to generalists, and too complex to be appreciated by citizens, legislators, or by narrowly trained specialists. What now?

The environment must be made an inevitable part of the undergraduate experience, but because of very real concerns such as those just cited, this will not be easy. I would like to propose a strategy.

First of all it must be acknowledged that arguments based on the need for college graduates to know about the environment, compelling though such arguments may be, are not likely to carry the day alone. There are simply too many things students "need to know." We must begin, nevertheless, by developing the conviction that, as subject matter goes, the environment is at least as important as anything else in the general education curriculum. Next, we have to develop arguments for environmental science based on the conventional rationale for general education, arguments that encompass writing and related skills, quantitative and logical skills (including data analysis), social science, natural science, and the humanities. Some examples: social sciences are found in all general education programs; perhaps a good case could be made for the idea that the proper study of man is not so much man as it is the study of humans in the system of nature. We should point out that ecology is more fundamental than culture. It is often said that to understand the Japanese we must first understand Japanese culture. But Japanese history and culture reflect the **ecology** of Japan, an island nation with scarce natural resources. One of the justifications offered for including history in general education is that those who fail to consider history are doomed to repeat it. We must make it clearer that those who fail to consider ecology are **doomed**.

We could easily link environmental science to the need for students to think and to reason. The beginning of this argument could be that environmental issues are, and will continue to be among the most important things students will be called upon to think and reason about. Although integrative/reasoning courses are found in many general education programs, the argument may well have to begin in some cases with the need for courses designed to give students integrative reasoning experiences. Such courses should be designed to illuminate the ways in which contending arguments are weighed and should provide practice in - so that graduates become comfortable with substantive debate or group reasoning. Although there is some evidence that reasoning can be taught, the idea is still hotly debated (see Nisbett, Fong, Lehman, and Cheng, 1987). There are at least two opposing points of view. One says that there are no inferential rules, only empirical rules covering specific events and situations; another argument is that rules of reason are specific to each individual - and thus cannot be taught. Even giving these arguments some credence, the best way to hedge all bets would be to help students learn logical reasoning skills by providing opportunities whereby they can practice and hone whatever they do when they reason.

We often get into trouble in our society because we ask and answer questions at the wrong level with too narrow a focus. Should a certain pesticide be used? The typical approach to answering this question might focus on the toxicity of the pesticide. If it is found safe, we use it. Considered at another level, however, perhaps the pesticide will result in the selection of resistant strains of pests and ultimately require more expensive, more chemically intensive strategies; perhaps the use of the pesticide will upset natural balances and end up causing more problems than it solves. Students should be helped to become keenly aware of the importance of asking the right questions at the right level. Issues courses should also help undergraduates come to appreciate the fact that they have power. Perhaps one of the things we now fail to do in educating citizens is to help them discover that they are the loci of control in our society - that people with conviction can indeed get things done even in a big, complex world steeped in inertia. After all, if people are to be responsible citizens, they must first believe that they can change things for better by bringing their intellect to bear on the search for solutions and by speaking out.

Could there be any better focus for an issues course than the environment? Ecology is the integrative discipline of the sciences and environmental science can be the integrative discipline of "all" the disciplines. Eugene Odum (1977) described a kind of new ecology, more than ten years ago as a new "integrative discipline that deals with the supraindividual levels of organization, an arena that is little touched by other disciplines as currently bounded...."

We should persuade our colleagues in the sciences that environmental science is not so much a threat as it is an opportunity to help students appreciate the importance of science. Perhaps this could be done by helping them see that what we are doing now is not very effective. In a 1979 study (see Miller, 1988), one of many documenting the scientific illiteracy of the American people, it was shown that only 7% of American adults met basic criteria for scientific literacy; a 1985 study suggested that this may have deteriorated to 5%. Among holders of BA degrees, the figure was 12%. Science is grossly under-represented in college curricula. According to the National Research Council (see McDonald, 1982), colleges "have lowered their science requirements over recent years to the alarming point where average non-specialists student devotes only about 7% of a college course load in the sciences." Even when students take science, they don't seem to get caught up in it. Science is still all too often presented as collections of stale, static facts, definitions, and esoteric formulas to be memorized outside of any meaningful context. A course illuminating science in the context of current serious issues would, at the very least, show the relevance of science to daily living and help illuminate science as an important, effective, way of giving shape to truth.

There is no more important product of higher education than graduates able to think and able to seek and find the truth. There is nothing more important to think about and discuss the truth about than our impacts on our Planet and the consequence of these impacts. Responsible environmental behavior ought to be one of the primary goals of general education.

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Conducting Your Own Abandoned Well Survey

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Abstract

Abandoned wells (oil, gas, and mineral exploration) represent a potential threat to groundwater, acting as direct pipelines for contaminants. Since abandoned wells must be found before they can be plugged, abandoned well surveys are necessary. Conducting these surveys educates citizens and school groups about groundwater issues, getting them involved in the groundwater management process in their local communities while providing state and county officials with this important information. A

leadership training manual and audiovisual presentation which teaches groups how to conduct a survey will be presented.

Groundwater contamination problems emerged as a national issue in the 1980s and continue to demand attention. Once assumed to be a reliable source of pure water, groundwater quality is now being threatened by human activities. In the Tennessee Valley, over 64 percent of the residents rely on groundwater for potable drinking water, and over 1.7 million residents in the region maintain household groundwater systems, usually a well. Groundwater contamination in the region is on the rise and has been documented from improper waste disposal, coal mining activities, oil and gas exploration, agricultural activities, septic tanks, and urban activities.

Abandoned water wells, oil and gas wells, and mineral exploration wells are all potential sources of groundwater contamination because they are a direct pipeline into underground aquifers. There may be a million or more abandoned wells in the United States. In the first 122 years of oil drilling alone (1859-1981), over 2,750,000 wells were drilled.[1] Of those drilled during that period, today only about 750,000 still produce oil or gas.[2] Many of the remaining 2 million wells have been abandoned, often without proper plugging.[3] Experts estimate that hundreds of thousands of mineral exploration wells also exist in addition to an uncounted number of abandoned water wells. As communities grow larger and develop public water systems, many more home water wells are being abandoned; many of these water wells are also not being properly plugged.

There are basically three types of environmental problems associated with abandoned wells—water quality, water quantity, and physical hazards. Wells typically become contaminated either indirectly by accidental spills or directly when materials are deposited into the well opening. Abandoned wells unfortunately have become a convenient way to illegally dispose of household garbage and harmful chemicals. To avoid the high costs of waste disposal, some companies have resorted to illegal "midnight dumping." Abandoned wells are ideal for this because they usually occur in remote rural areas on unoccupied property. Once the material has been poured in the well, there are usually no visible signs to alert passers-by. Once contaminated, groundwater is difficult and sometimes impossible to clean up.

When aquifers used for drinking water and other uses are contaminated, this creates water quantity problems. For example in 1986, in Wartburg, Tennessee, unregulated oil and gas exploration wells contaminated the town's aquifer.[4] Water had to be trucked in and transported in jugs to homes until a pipeline was installed to pump water from miles away into their community at a great expense to local and state taxpayers.

Abandoned wells are also a safety hazard to humans and livestock. Abandoned wells are often covered with temporary materials such as wooden boards, rocks, and metal sheets. An unsuspecting passer-by can fall into a well when these materials give way or are carelessly moved. In 1987, Jessica McClure, an 18-month old Texan child, fell into a 8-inch diameter abandoned well in her own backyard when 2 older children she was playing with apparently moved the rock covering the opening.[5]

Recognizing the importance of groundwater as a drinking water source to many communities, the 1987 amendments to the Clean Water Act specifically addressed the issue by requiring that communities develop groundwater management plans that recognize potential sources of contamination such as abandoned wells and develop a plan to address these problems.[6] Since abandoned wells must be located before they can be plugged, abandoned well surveys are necessary. Unfortunately, limited time and resources make it difficult for government agencies to proceed quickly even though they have the technical expertise and field crews to conduct the surveys.

It is for this reason that government agencies are turning increasingly to citizen volunteer organizations for assistance. For example in 1988, the EPA organized a conference to explore how to train and use citizen volunteers to collect a variety of data including surveys and ground truthing (verifying information by visiting a site).[7] EPA also suggested that citizen groups involved in these types of activities could also help governmental agencies by educating local people about "the dimensions of pollution problems that affect their lives.....and also help build the local and regional political will needed to support effective actions."[8]

TVA developed a teacher/student demonstration survey project in McMinn County, Tennessee, and a slide/tape program which has been converted to 1/2 inch VHS video. TVA is also developing an Abandoned Well Leadership Training Manual to encourage citizen and school groups to assist State and county officials in obtaining important information about the location and condition of abandoned wells in their own communities. In addition to participating in the survey, this program is designed to help citizens learn firsthand about groundwater and groundwater contamination issues, and become aware of and/or involved in the groundwater management process. This information, combined with other groundwater information such as recharge area boundaries and pollution potential surveys, can be used to help develop county-wide protection strategies required by the 1987 amendments to the Clean Water Act. The results of the survey can be used to set priorities for proper plugging of the most critical abandoned wells. Because plugging all abandoned wells will be costly and may not be

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politically easy, much of the success in getting abandoned wells plugged will depend on citizen involvement. Only people can protect groundwater.

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A Proven Plan for Chemical Redistribution and Disposal

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Abstract

This session will focus upon a recently completed Iowa statewide plan for the safe, cost effective redistribution and disposal of unwanted/hazardous chemicals.

Castle Rock Elementary Conservation Project

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Abstract

Recommendations for reclamation of a badly eroded area near their elementary school will be presented by eight sixth graders. Students will explain proposals they have made to the school board and city council in their suburban Colorado community.

Toxic waste. Acid rain. Greenhouse effect. Deforestation of the rain forests. Valdez. For anyone concerned with environmental issues, the world picture often looks quite bleak. For an educator who is trying to instill a sense of environmental awareness and concern in students, the frustration is even greater. How can we foster an environmental consciousness in our students without conveying a sense of hopelessness and helplessness?

Neil Sampson of the American Forestry Association, speaking at the annual Colorado Soil Conservation Conference in Gunnison last summer, provided an answer to that question. Discussing global warming and its possible long range effects on the United States, Sampson said there were three concrete steps educators could take to help mitigate those effects. "Plant a tree. Heal a gully. Teach a child."

Excited by the idea of an approach to environmental education which could produce tangible results, my teammates, Basil Jacobson and Mary Jo Costello, and I returned to our sixth grade classrooms eager to take that approach. We made conservation our ongoing theme for the 1988-89 school year, beginning with the extensive series of field study lessons. These lessons involved comparison studies of soil composition, geography, geology, flora, fauna, erosion, and natural and human impact in three areas near our elementary school.

Our town's namesake, Castle Rock, was our first study area. "The Rock" is a large, flat-topped sedimentary formation sitting atop a large hill. The hill is covered with various types of trees and vegetation. Several old, badly eroded trails lead to the base of the rock.

The second study area was a natural drainage gully, 3.7 acres in size, directly behind our building. This gully is full of grasses, shrubs, trees, and other vegetation. It provides an important wildlife habitat for our community.

The third area, which became the student's focus choice, is a severely eroded road cut bordering the school property. This road was cut by developers several years ago and was never finished. All the topsoil is gone, no vegetation has reestablished itself, and the area is covered with trash.

After completing the initial field studies, we asked the students to choose one of the three areas as the focus for ongoing study. We wanted them to develop a land use proposal with positive environmental impact for a focus area.

The class discussed developing plans for a city park around the base of Castle Rock, but soon after our field studies began the Town of Castle Rock had announced plans for just such a park. The students also discussed plans for an outdoor classroom in the gully, but decided to leave that for a future class. The students then chose to focus on the road cut for several reasons. They felt this area needed the most immediate attention. They also believed a proposal concerning this area had the greatest chance of being heard and accepted. Finally, the road's proximity to the school and to many of the students' homes created a sense of personal investment in the project; the students felt reclamation of the road cut would benefit them directly.

Working in small cooperative groups, the students developed four options for use of the road cut. The area could be left as it was. The road could be completed. The area could be turned into a park. Or, the road could be made into a bike path. The entire class eventually agreed that the fourth option, the bike path, was most desirable.

At this point, continued involvement in the project became voluntary. Students who continued to participate formed six committees. These committees met before and after school, as well as during their science and social studies classes.

The map and measurement committee drew maps of the area, indicating the extent of erosion which was present. They measured the length and width of the road cut and the sizes of some of the worst ruts.

The poster committee drew pictures of the road cut in its current state. Then, as the plans for reclamation proceeded, they illustrated their vision of the completed bike path.

The photography committee worked with the poster committee, providing photos of different types of erosion existing in the road cut. They also provided the vegetation committee with documentation of surrounding flora.

The vegetation and wildlife committees studied plants and animals found in the area surrounding the road cut. They identified shrubs, trees, and grasses and recommended which plants might be successfully revegetated. They also predicted what types of wildlife might then return.

These five committees compiled as much research and information as possible on their respective topics. They then gave their data to the sixth group, the presentation committee. This group of nine students took the information generated by their classmates and created a dynamic public presentation, detailing their proposal for the development of the bike path.

They began by creating five categories: topsoil, vegetation, water runoff, bike path, and expenses. As they synthesized the information they had been given, they organized it into these categories. They then agreed that they would work in pairs and that each pair would become expert in one of the categories.

Our Intermediate EBD teacher, Mary Freeman, worked with the students during this process. Once they had organized their data, she coached them in the dynamics of oral presentation. They practiced enunciation, expression, projection, and effective utilization of visual aids.

The students made their first public appearance in November, before the Douglas County Soil Conservation district's annual meeting. Then, in December, they presented their proposal to the Douglas County School Board. They received a letter of appreciation and commendation from the superintendent, and one board member commented that the board had never seen a better presentation.

The real test, though, was an appearance before the Town Council. The wheels of government turn slowly, even in a small town, and it was May before we were granted a spot on the Council's agenda. By that time, some rehearsal and refurbishing were in order.

Two new committees were formed, in order to continue the sense of this being an all class project. The survey committee developed a questionnaire which would be distributed to all those present at the council meeting. This survey asked (among other things) whether the respondent would favor adoption of the bike path proposal, what other alternatives might be considered, and whether the respondent would be willing to donate time and/or materials to make the bike path a reality.

A booklet committee condensed the basic components of the bike path proposal and compiled small pamphlets which were distributed to the council members before the presentation.

The presentation received enthusiastic response from the mayor, the council members, and the citizens in attendance at the meeting. Ten people responded to the survey. All ten indicated they favored adoption of the proposal, and all ten said they would be willing to donate time and/or materials to the project.

At this point, we do not know what will happen. The Town of Castle Rock may very well adopt the students' proposal. Or, as often happens with good ideas, it may remain just that, an idea. Whatever happens, though, these students have had an experience which many adults never do. They

have seen that they can make a difference. They can be heard. They can have an impact. We hope it is a lesson which will stay with each of them, reminding them to always be concerned about the big environmental picture, while working to make small changes in small places.

"Plant a tree. Heal a gully. Teach a child." Especially the children!

China's Water Resources: Too Much and Too Little

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Abstract

Although China contains between one fifth and one fourth and the world's population, her citizens have only about a fourth as much water per capita as people elsewhere. Endless cycles of floods and droughts have prevented the Chinese from enjoying the full rewards of their efforts to modernize their country. The slide presentation explores some of the post 1980 efforts of the Chinese to provide environmental education about water resources. Information about current hydro-electric projects, anti-dessertification efforts and water recovery programs will be included.

Web of Life - or Death

Dr. Helen Ross Russell
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Abstract

Food—Nutrition—World Hunger—The Environment—Greenhouse Effect—Oxygen Depletion—Pesticides—Politics—Greed—Ignorance—Population Explosion: The new web of life and death recognizes no political boundaries and must be addressed in the total curriculum.

It is unbelievable, whether we are talking about the richest country in the world with soup kitchens, with street people, with children suffering from malnutrition and infants dying or whether we are talking about our planet Earth, rich in natural resources, capable of supporting a great variety of life forms, with forests being razed, waters polluted, lands despoiled and people going to bed hungry and dying of starvation. There have always been periods of famine growing out of war, drought, floods, earthquakes and other natural calamities and certainly in the 20th Century when modern means of communication have kept the whole world informed of these happenings, emergency relief has been provided.

Most of today's food problems do not fall in these categories; they come from ignorance, selfishness and greed, often abetted by political shenanigans.

For many years the world has been concerned about starvation and death in Ethiopia which was suffering a severe drought. Food and help poured into the country. However, word began to trickle out that shipments of food brought death, destruction and displacement to the people in need since the food was Ethiopian government controlled and the government in turn used it to force movement of farmers off the land to less favorable sites, to pay Ethiopians to turn in their neighbors to firing squads and torture, or sold it in the market which meant that it went into the pantries of the rich, and to members of the government.

People had acted in good faith, but in ignorance. We have learned that for help to be effective and to reach the people who need it; it needs to be channelled through organizations that have native peoples on their staffs in towns and villages. Furthermore, the kind of help that is needed, except in times of major calamities, is not food, but the wherewithal to produce food. Seeds, tools, irrigation projects are long term investments in health and nutrition. And again, the advice and guidance from local leaders can be critical to the success of the project. Several years ago a well meaning group of individuals dug several wells in a desert area and set up an irrigation system using gas engines for pumping. Unfortunately gasoline was not available at a price that the villages could pay once the installers left with their trucks and equipment. The planners never thought of using solar energy. No one asked why human energy was still the primary source for moving water. No one asked what could be done to help make this project work efficiently for the people of this community. This is an extreme example, but it represents a kind of self-centered ignorance that says, "We know what you need; what we are offering is better than what you have," or "it's our money so we should be able to make the decisions."

Ignorance in giving can be costly in terms of human relationships and success of the project. But ignorance plays a much greater role. Ignorance creates many of our problems. Many of the third-world people who are having starvation or nutrition problems today are trapped in social and political systems created and supported by ignorance and greed.

A serious concern of environmentalists is the cutting of the tropical rain forests. Tropical rain forests with their rich vegetation and extensive interrelated animal communities certainly are a fine example of what John Storer called the Web of Life in his 1953 classic.

The systematic clearing of the tropical forests equal to an area the size of Ohio each year may more realistically be called a web of death. The clearing takes place for a variety of reasons. Brazil started destroying forests to create farms and settled unemployed families, mostly of Germanic origin from the cities. Several years later the fairskinned children were suffering from the highest percentage of skin cancer anywhere in the world, while the soils without their tree cover leached and eroded. In the meantime, as more and more land was cleared, native cultures unchanged by the modern world were destroyed — sometimes by actual extermination of people — sometimes by removal from their habitat. And of course, unknown numbers of plants and animals have become extinct as habitat has been destroyed. We have no idea of the possibilities for healing medicine, that have disappeared with the forest. The web of death is truly as interwoven as the web of life.

What makes this destruction profitable? The biggest single crop produced on cleared land is cattle which is shipped to the United States and sold as cheap beef principally to the fast food chains. I have a five year old Kenyan friend who tells me "McDonalds is a very good restaurant. It serves really good food: hamburgers, french fries, and coca-cola!" There is nothing I can say to change her mind. But the fourth grade to which I teach an all year unit on human health, starting with a nutrition study that culminates in a vegetarian meal where everyone selects items from a buffet containing legumes, grains, seeds, nuts, dairy products, then passes a "checkout counter" explaining their selection of three complete proteins is ready to tell me that McDonalds, and their ilk, represents poor nutrition, intensifies solid waste problems and, by contributing to deforestation, creates environmental problems for all of us who depend on oxygen from tropical forests for our winter supply of three pounds of oxygen per person per day.

Most people are even more ignorant about their source of oxygen, than about their food and water supply. In winter I often stand with teachers on city streets, or farmland surrounded by bare branched trees, and ask, "Where is your oxygen coming from?" and am told "the trees!"

Ignorance and greed. The failure to recognize the role of wind as a primary fiber in the web of life, the choice of a menu that sells our birthright for a cheap cholesterol-laden fast food that contributes to the impoverishing of another country is a terrifying phenomena.

Brazil started cutting its rain forest in order to solve the problem of homeless, of the dwellers in barrios, of the hungry. Others are cutting forests under pressure of the World Bank to repay loans. Nicaragua is trying to replant its rain forests which were cut down by U.S. lumber companies under the Somoza regime. As long as they paid bribes to that outrageous dictator who, like Marcos and Papa Doc, treated his country as one great piece of personal property and its citizens as his peons, they were permitted to clearcut without any reforestry program.

Frequently, overpopulation is listed as a cause for world hunger. Overpopulation does create a variety of problems and it is definitely a problem that keeps growing.

There is enough food produced in the world today, however, to feed everyone. The problem is one of distribution. Look for a minute at the tons of wasted food carried to landfills in the United States everyday. Some restaurants in New York City send left-over food to soup kitchens while others dump it in garbage cans and pour formaldehyde over it so it cannot be eaten and so homeless will not come on their street and disturb business or their conscience.

I walked through a school cafeteria where children were eating breakfast. I watched as they threw out unopened cartons of cereal, orange juice, and milk. When I asked why children were not permitted to take what they wanted, I was told that it was good economy — they only needed two people to operate the program. When I mentioned the breakfastless people I had passed two blocks from the school, I was told that nothing could be done about them. In fact, a worker had been fired for trying to leave the building with a shopping bag of cartons she had retrieved from the garbage cans to take to people in need.

Worldwide, the problem is also one of distribution. Frances Moore Lappe in Diet for a Small Planet reports that it takes 16 pounds of grain to produce one pound of beef, six pounds for a pound of pork, three for poultry. I go to restaurants and see one pound steaks on the menu and I do remember the starving. Not that cleaning my plate will do anything for the hungry. But eating lower on the food chain, and influencing others, can help. Spending less money for fancy food or too much food and using what is saved to support intelligent outreach and education can change things.

Another major factor in the unequal distribution of food is the export of exotic food from tropical and southern hemisphere countries. Very few people know or realize that asparagus is only a spring crop — after all its available in September, and brings big prices on the market. It sounds as though purchasing it — and a raft of other imported gourmet items would help the economy and, therefore, alleviate hunger. But when we know that crops of this type are grown on huge land holdings with labor badly paid, or seasonally hired, and that laborers no longer have plots of land to produce food for their own families, then we realize that the price for the producing countries is much too high. In 1915, Liberty Hyde Bailey wrote in **The Holy Earth**, "People who work the land should own it." This is still true today.

What do we do to prevent the web of life from becoming a web of death? We must use television effectively as a tool for promoting learning and understandings. We must educate our young people to think environmentally. We must take responsibility for the actions of our government by writing letters, by supporting groups like the National Resource Defense Council, and Common Cause. We must work for peace and justice. We must actively care.

Educating the Public About Recycling: Getting the Word Out

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Abstract

How do people gain information about recycling? This presentation reports on a survey which confirmed the value of providing a variety of sources of information. Implications for designing a public education program will be discussed.

New Jersey instituted statewide mandatory recycling in April, 1987. The legislation requires communities to create recycling programs that reduce their waste stream by at least 25%. The first county in New Jersey to institute mandatory recycling, Somerset County, initiated a pilot program in 1985. Mandatory recycling began in the county during September, 1986 (seven months before statewide mandatory recycling became effective). The county program required each of the 21 communities within Somerset County to develop a recycling plan utilizing either curbside pick-up or drop-off centers. Each program provides for the recycling of at least three materials; communities can choose among a list of recyclables, such as aluminum cans, glass bottles, newspapers and magazines. Recycling rates in the county have steadily increased, climbing from an average of 100 tons per month in 1986 to 2,000 tons per month in 1988.

As mandatory recycling was phased in, household participation rates increased dramatically. An estimated 47% of the households were recycling by the end of the first year of the program. But even with the power of legislative mandates, and the implementation of support services such as curbside pick-up of recyclables, full participation has not been achieved. In trying to get the word out about how and when to recycle, it was recognized that people obtain information from a variety of sources. Consequently, an important question became, what sources of information do residents feel are most useful in learning about recycling?

Study Methods

To understand more about where people get their information about recycling, a survey was developed in cooperation jointly with the Somerset County Offices of Recycling and Public Information.[1] The questionnaire asked residents to indicate how helpful various methods of information dissemination had been. Residents rated 16 different methods of gaining information about recycling (newspaper stories, exhibits, newsletters, etc.) on a five point scale with one being not helpful and five being very helpful (see Table 1). Of the 1,500 surveys sent to a random sample of residents in Somerset County, 567 or approximately 37% of the surveys were returned.

Results

The questionnaire responses reflected the utility of a broad range of potential sources of information. It is instructive to examine which types of information were found to be most helpful. To facilitate the discussion, the information sources have been grouped into four general categories: media as a source of information, information delivered directly to the home, community based sources of information, and informal methods of gaining information.

The Media as a Source of Information

The capacity of mass media (television, radio, magazines, and newspapers) to deliver messages to large audiences is reflected in the number of residents who considered various forms of media helpful in gaining information about recycling (Table 1). Fifty-five percent of those responding to the survey named newspaper stories as an important source of information, 40.9% chose newspaper ads, 34.2% named TV programs, while radio programs and magazine articles were indicated by 27.1% and 26.4% respectively.

It is interesting to note that two of the most highly rated information sources are newspaper stories and newspaper ads. One would suspect that newspaper stories and ads provide specific, locally relevant information concerning recycling as compared to television, radio, and magazine coverage that may focus on the issues in general.

Information Delivered Directly to the Home

Information delivered directly to the home, and especially information in the form of newsletters, brochures, and flyers seems to provide an effective method of reaching a large proportion of the Somerset County community. As can be seen in Table 1, materials received directly in the mail were named as important sources of information by 53% of the respondents. Similarly, leaflets or notes about recycling left with the residents' garbage cans or recyclables at the curb were considered important by 31.5% of the residents. Two additional methods of reaching the public, inserts placed with the tax bill and recycling contests, were mentioned less often (18.5% and 8.2% respectively).

It is interesting to note that although contests, as a promotional method, may serve to raise awareness of the recycling effort, they are not seen as a particularly helpful source of information. Likewise, piggy-backing information on a one shot basis (e.g. as an insert in the tax bill) did not seem to be particularly effective compared to other direct methods of dissemination.

Community Based Sources of Information

When people leave their homes to shop, go to work, or attend community activities, they may be exposed to both formal and informal sources of information concerning recycling. To some extent, these are chance encounters; not all residents will go by the shopping mall while a recycling exhibit is on display. Consequently, it is not too surprising that community based methods of information dissemination were not, for the most part, highly rated by a large proportion of the population.

Twenty-six percent of the residents indicated that information received through community groups (church, 4-H, environmental groups, etc.) has been helpful; 13.4% names special exhibits (at shopping malls, 4-H fairs, libraries, etc.) as an important source of information; and 13.1% named presentations made to local, civic or business groups (Rotary, League of Women Voters, Chamber of Commerce).

Informal Methods of Gaining Information

People talk with one another; neighbors, relatives, co-workers all share information, and at times, misinformation. Although not considered as helpful of a course of information as some of the formal methods discussed above (i.e., media, formal presentations), informal discussions among friends and family seem to serve as an important conduit for information about recycling. Neighbors, friends, and co-workers were considered helpful sources of information by 20.1% of the residents; relatives (spouse, parents, etc.) were named by 16.4%.

Similarly, although it would not be surprising to find that children learn about recycling at home from their parents, it is interesting to consider that parents learn from material developed primarily for their children. Twenty-four percent of the respondents who have school aged children thought that educational materials brought home by their children served as a helpful source of information; in addition; 13.7% named newspaper stories geared toward children as a helpful information source. It is significant to note that information developed and disseminated for one particular group may in actuality reach a far different audience.

Summary and Implications

The findings of the survey confirm that people get their information from a variety of sources. Some individuals listen to the radio regularly, while others are avid readers of the local newspaper. Some participate in community organizations; some have school aged children. The diverse activities and habits of a population are reflected in the variety of ways they are exposed to information. No one source of information was identified as the way of disseminating information to the residents. Instead, the data suggest that a diverse strategy which takes advantage of the media's ability to get people's attention, provides specific information directly to residents through the mail, and taps into the educational system should effectively reach the desired audience.

Table 1
Sources of Information

Source[1]	Mean[2]	Percent Indicating		
		Not/a little helpful	Helpful	Helped a lot/ very helpful
newspaper	3.63	14.3	30.7	55.0
direct-mail	3.53	20.8	26.2	53.0
news ads	3.19	28.6	30.5	40.9
TV programs	2.95	37.2	28.5	34.2
radio	2.73	43.2	29.8	27.1
magazine	2.72	42.4	31.1	26.4
ed materials[3]	2.69	48.0	27.4	24.6
leaflets	2.67	47.7	20.7	31.5
community	2.63	47.8	25.7	26.5
neighbors	2.57	46.0	33.9	20.1
relatives	2.37	53.5	30.2	16.4
tax inserts	2.31	59.4	21.8	18.8
exhibits	2.21	61.7	24.9	13.4

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[1] The survey of information sources was part of a larger 86 item questionnaire designed to gain data concerning why residents participate in the recycling program, how they feel about it, and the degree to which they participate in solid waste reduction behaviors as well as respondent demographics.

news-child[3]	⌈2.19	60.5	25.8	13.7
civic groups	⌊1.88	71.8	15.1	13.1
contests	1.72	77.8	13.9	8.2

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[1] The amount or frequency of information provided to the residents by each source prior to the study was not controlled. Some methods of disseminating information are, by their very nature, less likely to reach large proportions of the population on a regular basis.

[2] Information sources connected by brackets were not found to be significantly different at the .01 level.

[3] Results based only on answers given by respondents who have children living at home.

Earthwatching III: A Reader on the Environment

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Abstract

A new book adapted from a radio program helps teachers introduce students to current environmental issues. Topics range from the greenhouse effect to recycling. Appendices suggest ways to integrate the material into conventional curriculum subjects.

Wilderness Tourism: A Need for Environmental Education

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Abstract

Wilderness tourism industry is on the increase and so are the associated wildlife impacts. The role of environmental education in nonconsumptive wildlife management will be discussed in terms of wilderness tourism in the western arctic.

The Fight for Utah's Wilderness

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and
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Abstract

The vast and often spectacular landholdings of the Bureau of Land Management were not subject to the Wilderness Act of 1964; the process of creating BLM's first wilderness areas is occurring only now, under terms of separate legislation. Of all affected states, perhaps none has received more national attention than Utah, where stakes are high and opinions widely divergent.

The Agency and the Law

The Bureau of Land Management administers those federal lands not assigned to other agencies for special purposes, such as national parks, wildlife refuges, and military reservations. It is responsible for 43% of all federal lands, including 29% of all land in Alaska and 9% of all land in the contiguous 48 states, the latter holdings being mainly in the intermountain desert areas of the eleven western states. In the decades following its inception in 1946, citizen conservationists became increasingly worried about BLM's lack of a clear mission and about the stress put on its lands by grazing, mining, and motorized recreation. Their concern led to passage of the Federal Land Policy Management Act of 1976 (FLPMA, pronounced "Flipma"), the long-awaited "organic act" which assigned to BLM a multiple-use mission similar to that of the Forest Service and granted the agency at least somewhat more authority to make and enforce adequate management policies (94th Congress 1976; Shanks 1978; Lavender 1983).

Pertinent to the present paper is Section 603, which in effect directs the agency to begin placing suitable BLM lands in the contiguous 48 states into the National Wilderness Preservation System. Created by the Wilderness Act of 1964, the system had previously contained only lands administered by the National Park Service, the U.S. Forest Service, and the U.S. Fish & Wildlife Service.

Section 603 gives the Secretary of the Interior the period 1976-1991 to review BLM roadless areas of 5,000 acres or more, determine the suitability of each area for protection as wilderness, and "from time to time" report to the President his wilderness recommendations. The President has two years from the receipt of each set of recommendations to send them on, modified or unchanged, to Congress for their consideration.

Acting as the Secretary's agent in this process, BLM reviewed the 177 million acres (177 mil A) of its holdings in the contiguous states, and placed 24.7 mil A of these into what it calls Wilderness Study Areas (WSAs). The agency is currently completing its further study of these areas and apparently will recommend about 10 mil A for wilderness designation. If approved by Congress, this amount would raise to 2.3% the portion of total land in the contiguous 48 designated as federal wilderness areas. The present figure is 1.8%.

Predictably, wilderness advocates are critical of BLM's implementation of the law. They maintain that the WSAs do not include all the areas that should have been studied, that WSAs or portions thereof deserving wilderness designation were not recommended, and that roads and other incursions have been allowed in WSAs and other wilderness-suitable areas in violation of Section 603 (Sopher 1981; Baker 1983; Stegner 1986; Mitchell 1988; Udall 1988). They place some blame on the ideology of the Reagan administration and some on the BLM's historic accommodation of grazing, mining, and motorized recreation interests.

Utah Wilderness

The process in Utah has attracted much attention (Baker 1983; Stegner 1986; Aitchison 1987; Mitchell 1988; Udall 1988), partly because so much spectacular, pristine, remote, and sparsely inhabited land is at stake.

The southeastern one-third of the state, bounded on the north and west by interstate highways I-70 and I-15, is considered by some to be the most spectacular landscape on earth, a portion of the Colorado Plateau where multicolored slickrock is carved into the myriad dramatic shapes found in Arches, Canyonlands, Capitol Reef, Zion, and Bryce Canyon National Parks and Natural Bridges and Rainbow Bridge National Monuments. Mingling with these National Park Service areas are a multitude of comparably marvelous if less known holdings of the BLM — the canyons of the Escalante, the San Rafael Swell and Reef, the Black Boxes, Arch and Labyrinth Canyons, Comb Ridge, and the Cockscomb, to name but a few. BLM's Utah office has recognized some 56 WSAs here.

The western one-third of the state — almost everything west of I-15 — is very different. Called the West Desert, it is the eastern edge of the Basin and Range Province which extends on across Nevada. The province is a land of roughly parallel north-south mountain ranges rising like islands from the flat sagebrush desert. In Utah, these mountains contain a dozen of the state's 82 WSAs.

In both of these physiographic provinces, the absence of human settlement contributes to wilderness suitability. The twelve counties containing almost all of BLM's wilderness study areas have a median county population density of only two persons per square mile (BLM 1986). This population is concentrated in and around a few towns and villages, leaving the agency's vast nearby lands unpeopled.

In 1978, BLM began the FLPMA-mandated inventory of its 22 million Utah acres — 42% of the state's land area — and in 1980 it designated 2.6 mil A as WSAs (BLM 1980). In subsequent developments:

-- In 1981, a successful appeal by Utah conservationists brought WSA acreage up to 3.2 mil A.

-- In 1985, Utah environmental groups formed the Utah Wilderness Coalition (UWC) and proposed wilderness protection for tracts totaling 5.1 mil A, about 10% of the state's land area (UWC 1989).

-- The following January, BLM published its seven-volume proposal to protect 1.9 of the 3.2 mil A as wilderness areas. Conservationists from Utah and elsewhere responded with 4,000 letters calling for the 5.1 mil A advocated by UWC.

-- By 1988 UWC membership had reached 25 member organizations, and in spring 1989 one of its principal members, the Southern Utah Wilderness Alliance, announced that it had doubled its membership to 3,000 in the past year, and was now planning to contact 160,000 potential new members nationwide in its 1989 direct mail campaign.

-- In the Spring of 1989, Utah's three U.S. representatives all introduced wilderness bills in the House or planned to do so soon: Democrat Wayne Owens, the 5.1 mil A favored by UWC (Greeno 1989) and Republicans James Hansen and Howard Nielson, 1.4 mil A and something under 1 mil A, respectively. Like Hansen and Nielson, the state's two senators and its governor, all Republicans, favor some amount below the BLM's recommendation of 1.9 mil A.

-- The bureau is due to publish its final recommendations in December 1989.

Some additional pertinent observations:

Throughout this process BLM has held public hearings and invited public comment, and appears to have utilized much of the input in its published planning documents. Now, public comment will shift to the halls of Congress.

In the identification of WSAs, the only criteria used were wilderness characteristics such as naturalness and potential for solitude (BLM 1980), but the presence of mineral and fossil fuel resources was an important criterion for exclusion at the next step (BLM 1986). Wilderness advocates argue that the wilderness value of the excluded areas exceeds their mineral value.

Even in those areas eventually designated as wilderness, present levels of grazing will be allowed to continue and non-motorized hunting will be permitted. Existing mining claims can be developed only "in a manner not degrading to wilderness values" (BLM 1986).

WSAs account for more than 6% of Utah's land area but only one-tenth of 1% of its employment. Of the 727 jobs generated by WSA lands, 596 are in ranching, which would not be curtailed by wilderness status; 77 are in recreation, 54 in mining (BLM 1986). However, eight of the twelve most affected counties have double-digit unemployment. So, while grazing may already meet or exceed carrying capacity, mineral potential on WSAs is not overlooked by local residents.

Conclusion

The fight for Utah's wilderness has the earmarks of a typical environmental battle of the American West, with Republicans, local residents, and extractive industries arrayed against Democrats, metropolitan residents, and a national constituency of environmentalists, with use of our federal lands as the prize.

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Environmental Education: Practical Application

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Trenton, New Jersey
and
Dennis Yockers, Environmental Education Co-ordinator
Wisconsin Division of Natural Resources
Madison, Wisconsin

Abstract

An in-depth presentation that addresses the issue of solid waste management and the combination of solutions necessary to solve the dilemma. Particular attention will be given to co-operative efforts, as well as communication and education strategies.

Motivation and Learning Through Action

Randolph Tully and Bill Hammond
EEIDS
Fort Meyers, Florida

Abstract

Investigate three pragmatic action programs involving high school students in their local community with environmental construction and landscaping projects, scientific ecosystem investigation, and positive political action. Explore their curricula, review specific activity modules, learn "how-to."

Strand 4

International Cooperative Ventures

Environmental Education for Sustainable Development

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Abstract

Concern for environmental education has been a long tradition in Indian social and cultural life. In recent years there have been efforts to create public awareness and action on environmental issues for the protection and conservation of natural resources. The International Conference on Environmental Education was organized in 1981 and 1985. The third conference is planned October 3-7, 1989 at Goa in India. The theme of the conference is Environmental Education for Sustainable Development. The author plans to discuss programs and activities which have been generated as the result of these meetings.

The Peace Corps Environmental Education Initiative

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Abstract

In January, 1987, the Peace Corps gathered environmental educators from around the country to discuss how environmental education could best be incorporated into all Peace Corps volunteer training. Since then, several environmental education workshops have taken place around the world including one in Honduras and one in Belize. In this 30-minute session, you'll get an update on this exciting environmental education initiative and discover ways you and your organization can help.

Breaking New Ground: The Development of Environmental Education Programs in Mexico

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and
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Abstract

Environmental education has been determined to be a critical element to insure the future of Mexico's natural resources. A U.S. and Mexican university joined together to develop environmental education programs for students, general public, and professionals.

To speak of environmental education in Mexico is to speak of recent times. Although we have recognized the importance of environmental education, efforts to implement such programs over the last two decades have achieved few results.

The history of Mexico's environmental dilemma may be divided into three periods. The first began at the end of the revolution in 1930 and lasted through the late 1950s. During this period, the government's priority was industrialization and everything else, including development of a sound national conservation plan, was put aside.

The second period occurred from the 1950s to the late 1970s and was characterized by abuse of the country's natural resources. A literal rape of the land occurred in the name of "development." Toward the end of this period, the government began to take steps to promote better utilization of the land by attempting to educate for more efficient use of the resources. However, at the same time, there was an even greater effort to increase the use of productive lands for crops, grazing, and logging. Unfortunately, this resulted in overgrazing, deforestation, and erosion.

Use of the term conservation as "wise use" of natural resources arrived in Mexico at the beginning of the third period. Scientists, academics, and conservationists began to call attention to the country's abuse and bring to light the errors in a system that destroys its own lifeblood. At this point, the country's tropical rainforest had become endangered or extinct. As the biodiversity of the country, which ranks fourth in the world, became threatened, national and international conservation groups began to focus on the country's plight. Mexican politicians began to throw terms such as ecology, conservation, and environment about, but with hollow meanings, as very little was done to address the problems of natural resource abuse on a national scale.

Efforts to identify resources for use in environmental education were not successful. Guidelines available fo such programs were, for the most part, developed in industrialized countries and did not readily fit Mexican problems. Additionally, the environmental situation in Mexico had reached a point where environmental education was needed at the decision-making levels.

Awareness of environmental issues was increased in 1982 when the newly elected government created the office of Secretary of Ecology and Urban Development. This cabinet level officer, along with the Secretary of Public Education, started a program of environmental education, using mass media and other vehicles to reach the general public and young students. About the same time, the non-governmental organization Profauna joined forces with the Universidad Antonio Narro to develop a course for elementary and secondary curricula focusing on ecology and natural resources of Mexico.

Results of the initial program in environmental education were very discouraging. It did capture the attention of some mid-level officials within the office of Public Education Secretary. A program entitled "Take Care of Yourself" was developed focusing on three issues: anti-drug, personal care, and environmental awareness. Unfortunately, there was no training on how to teach and implement the program. Likewise, Profauna and the university could not determine how such an effort should be organized and implemented.

In June of 1988, the forestry department of Antonio Narro University organized and conducted the 2nd Rio Grande Border States Conference in Saltillo, Coahuilla. Dr. David M. Knotts, representing the School of Forestry at Stephen F. Austin State University, presented a paper on environmental/conservation education. Subsequent conservation resulted in the ground work being laid for a joint effort between the schools of forestry of each university to develop a model environmental education program for Mexico.

In November of 1988, a team of Mexican educators and natural resource management professionals attended a week-long orientation course in environmental education at the Piney Woods Conservation Center in east Texas. Selection of the team was critical as we wanted a balance of educators from the state education system and the federal system. Team members had to commit to putting in a few hours each week upon their return to organizing a local training program for other educators. The team members were exposed to a variety of environmental and conservation education programs deemed successful in the United States. Programs such as Project WILD and Project Learning Tree were reviewed and considered for adaption and "Mexicanization." Leadership and workshop organization skills were taught and a plan of implementation was developed.

Upon returning to Mexico, the team conducted a local level follow-up workshop with very positive results. The goal is to train 60 educators in the state of Coahuilla who will serve as additional trainers and work to develop a model environmental education program for the remainder of the country.

To this end, many of the ideas gleaned from the American programs have been adapted for the Mexican culture and integrated into the national school system. A workshop was also held for 60 senior students in the School of Education. These students participated in the Urban Forestation Program. They were presented selected activities from Project Learning Tree the week prior to the reforestation program, and taught how to present the material to public school students. The workshops were so successful that many teachers outside the program have expressed interest in and a desire for training.

The increased respect and visibility of these environmental education efforts resulted in a five-minute television program once a week which will soon be increased to twice a week.

To further develop teacher confidence and experience in presenting environmental education activities and concepts, special training programs on Saturday have been set up. This allows newly trained teachers to test the reaction of children on the adapted activities, enhance presentation skills, gauge the time and attention level required, and evaluate new activities and games.

Perhaps the most surprising result of all was the acceptance by college and university level students of the elementary and secondary level environmental education activities. What started out as an experiment is now part of regular university curriculum. These activities have also been presented in public places involving the public with beautiful results.

The goal now is to solidify the program in Coahuilla and eventually offer training in the surrounding states of northern Mexico. Training for natural resource managers and game wardens is also planned to help them learn public communication skills and techniques of working with teachers involved in environmental education.

Like so many programs, funding is now the major limitation. The experience of this past year has convinced many government officials and education administrators that we are now on the right track. We are convinced and are convincing others that conservation/environmental education is a continuous, multi-disciplinary, multi-level process which can influence the direction of Mexico's conservation efforts.

Trends and Megatrends in International Environmental Leadership, Cooperative Ventures and Networking Through the United Nations

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Abstract

The sub-thesis for this paper will emanate from three main tenants. They are as follows: 1) That which constitutes "international environmentalism" as a belief/value system and how does this translate into international environmental leadership? 2) That international environmental leadership as a "germination tool" can sow the seeds of cooperative ventures and networking. 3) That trends and cyclical movements in the "Global Village" promise support international environmental leadership, cooperative ventures, and networking. These three tenants will ramify into the past, present, and future status of key environmental organizations tackling international issues.

In John Naisbitt's Megatrends, the author describes a restructuring of America and of the international environmental leadership. Fundamental shifts include:

1) That "the United States has shifted from an industrialized society to one based on the creation and distribution of information in bits and bytes in what is called the "New International Information Order (NIIO) as described in the 1980 McBride Commission UNESCO Report" (pp. xxii).

2) That "no longer do countries have the continuing luxury of operating single-handedly within an isolated, self-sufficient, national economic system; now countries must acknowledge that they are part of a global economy working as a global brain servicing a global village of consumers and producers. Hence, our long-term considerations should be as an information consumer-producer society on how best to protect, recreate, preserve and maintain our national environment and habitat for future generations" (pp. xxii).

3) That from "a narrow either/or society with a united range of environmental choices, we are exploding into a free-wheeling multiple option universe with a-spend-thrift mentality" (pp. xxiii). This means that we care enough for the future fate of this "endangered planet" given its current pressing concerns; e.g., global warming, ozone depletion, desertification, etc. Hence, that concern should be translated into international

fellowship, cooperative ventures and networking through member countries in the United Nations, UNEP and its specialized agencies.

The first goal of this international cooperative effort should be to gather the vital information needed to fashion effective policies. "We've got to get the earth in intensive care, to start to monitor the vital symptoms of the planet," said John Eddy of the University Corporation for Atmospheric Research (UCAR) in Boulder. This could be done by launching an International Earthwatch Program (IEP), possibly under the aegis of the United Nations, to coordinate multinational research projects and centralize essential data on the environmental state of the world—including trends and megatrends on earth's resources. Such an umbrella program could pool the results of hundreds of existing research efforts. A prime candidate for this program would be the Mission to Planet Earth (MPE), recommended by former astronaut Sally Ride, which would use NASA facilities to study the "endangered earth" from space. In addition to improving knowledge of the earth's ills, an International Earthwatch Program could provide a widespread environmental awareness-building campaign. This campaign would prepare public opinion for the sacrifices and life-style changes that will be necessary in the coming decades. Environmental Education Programs could be immediately introduced into schools and workplaces around the world, and government leaders should bring these crucial issues into the heart of political debate.

A framework for such international fellowship and cooperative ventures exists within the U.N. which has already taken some important initiatives. In 1972, the U.N. organized the landmark Stockholm Conference, which set up the United Nations Environment Program (UNEP). It was under UNEP's sponsorship that 24 countries signed the 1987 Montreal Protocol, calling for a reduction in the output of ozone-destroying chlorofluorocarbons (CFCs). There have also been proposals to enhance UNEP's role as a sort of "intergovernmental superagency" on environmental questions.

One by-product of this new approach is an environmental action plan for Madagascar currently monitored by UNEP. The 20-year plan, which will be drawn up jointly with the World Wide Fund for Nature (WWFN), aims at heightening public awareness of environmental issues, setting up and managing protected areas and encouraging sustainable development. Similar aims should also guide the lending policies of the International Monetary Fund (IMF), regional development banks and bilateral assistance programs.

In my opinion, much of the current environmental crisis is rooted in, and exacerbated by, the widening gap between rich and poor nations. Industrialized countries contain only 23% of the world's population, yet they control 80% of the world's goods and are also responsible for the bulk of its land, water, and air pollution. On the other hand, it is the developing countries that are hardest hit by factors of overpopulation, malnutrition, disease and famine. As these nations struggle to catch up with the developed world, a vicious circle begins: their efforts at rapid industrialization poison their cities, while their attempts to boost agricultural production often result in the destruction of their forests and the depletion of their soils.

The greatest obstacle to economic and environmental improvements in the developing countries is their mammoth foreign debt. Collectively, the Third World owes $1.2 trillion to the banks and governments of industrialized countries. The best way of reducing the negative impact of debt imbalances may be of using debt forgiveness as leverage for winning environmental concessions.

One approach that has already been pursued successfully on a small scale is the so-called debt-for-nature swaps. Conceived by the Smithsonian Institution's Thomas Lovejoy in 1984, these innovative deals often involve the cooperation of governments, bankers and conservation groups. In a typical debt-for-nature swap earlier this year, the World Wildlife Fund, a nonprofit organization based in Washington, bought $1 million worth of Ecuadoran debt held by Bankers Trust at the discounted price of $354,500. The bank was happy to get the troublesome loan off its books, while the World Wildlife Fund gained the power to improve that country's environment.

However it is accomplished, a greater share of the world's capital will have to flow into developing countries. What they need, said Senator Albert Gore, "is a new Marshall Plan for economic development and environmental preservation." But where will the money come from? For starters, the U.S. and the Soviet Union could reduce military spending in order to boost aid for environmental programs. Nobel laureate Murray Gell-Mann, a professor of theoretical physics at the California Institute of Technology (CIT), argued that the superpowers should redefine "global security" to include "the issues of population, environment and sustainable development and promote security through international agencies like the United Nations."

The United Nations, in my estimation, is the most democratic, well articulated organization (based on the weight of global opinion rather than coercion) capable of handling environmental issues of the past, present and future.

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Using TV to Teach Indian Students about the Environment

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Abstract

For over a year, an Indian NGO, a U.S. University and a U.S. Federal Agency have been cooperating on an innovative project to use television as a tool for teaching Indian students about environmental issues. When the project is completed, 13 educational modules will have been produced. Each module will consist of a video program with written teacher orientation materials, student activities, and support resources. Additional products from the project will be reports on children's educational television and a concepts data base from which module objectives and topics are drawn. Participants in this session will have an opportunity to see the "premier" of the first video in the series. Project co-principles will discuss the use of educational TV in India, specific project goals, educational techniques employed, and future topics in the series.

Education for Sustainable Development: Response to the Brundtland Report

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Abstract

Our Common Future, the report of the World Commission on Environment and Development (WCED), presented by Prime Minister Gro Harlem Brundtland of Norway to the United Nations General Assembly in October, 1987, is the most comprehensive and persuasive recent analysis of environmental and social challenges facing the Earth today. As such, Our Common Future is a mandate for fundamental rethinking of policies as well as political, economic, educational, institutional and legal structures in all nations. The Global Tomorrow Coalition will hold the first comprehensive United States hearing on the WCED Report on November 1-2, 1989, as part of the Pacific Globescope Conference being held November 1-5 in Los Angeles. This hearing and the Pacific Globescope are timed for the early period of President Bush's administration. The workshop has several purposes: 1) To assure participation of NAEE members in the development of implementation strategies for Our Common Future. 2) To develop proposals for effective environmental education and environmental studies activities on global issues during the coming decade of the 1990s. 3) To foster communication involving environmental educators and scholars in schools and governmental agencies with counterparts in nongovernmental environmental organizations (NGOs).

Energy Education for Sustainable Development of Mountain Villages

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Abstract

Bio-mass is a crucial commodity for energy in rural India, particularly in the mountains, where forests provide the major source resulting in significant denudation. Author examined: the nature of demand, exploitable sources of energy; energy consuming activities, building and settlement typologies, and developed a short course which was conducted in August, 1988.

This paper is based on a study conducted in a few mountain villages to understand the various sources of energy used for domestic consumption, attempts to co-relate various factors responsible for the levels of consumption, and offer suggestions to improve the consumption pattern and avenues to encourage education.

Forest produce, traditionally has been seen by the mountain people as a free gift of nature and they have exploited the resources without any significant detriment to its quantity and quality for centuries. Due to inaccessible location, forests in the hills were secure from commercial exploitation until recently. However, it was noticed that during the period of 1975-77 and 1980-82, there has been significant forest degradation.

The rapidly dwindling forest resources cannot be attributed entirely to uncaring commercial exploitation of timber. It is necessary to examine if this could also be related to the growth of population, habitat pattern, social habits, energy requirements, and socio-economic conditions. Sixty-nine districts (out of a total of 402 districts) of India are located in the mountain ranges of Himalaya. 20.9 million people (3% of the total population) live in these districts, and the population as a whole has been growing at the rate of 34.96% between 1971-81, which is higher than the India average (25.04%).

Traditionally, the hill population is remarkably self-sufficient. They produce almost everything they need for survival, and manage to procure all their energy sources from the neighborhood. Food is produced locally; all building materials such as stone, wood, and slate are available locally, and clothing is woven with wool from the sheep they rear. Dependence on forest resources for cooking and heating, building construction, and animal pasture has been seen as a right, a way of survival, and a pattern of life. Due to inaccessibility, the hill people have been able to retain their ethnic identity, and the culture of the tribe predominates. They resent any attempt to interfere as an invasion of their privacy and rights. Hill people loathe to accept that the forest is in any way damaged by their activities and view all attempts to regulate their access to the forest as unwanted interference.

However, it is imperative, that in order to restore the level of desired forest cover, commercial exploitation of timber should be drastically reduced. Governments of the States and the Centre for Environmental Studies have already undertaken administrative measures to effect this. It is also necessary to estimate the ability of the freely available bio-mass to support the increasing rate of consumption by the hill people; and if necessary, arrive at alternate energy strategies. Since the forest produce is seen as a free gift of nature, any alternative resource should also be cheap, if not altogether free. The task of converting people to move away from traditional ways is likely to be difficult. The process of convincing them about any alternate technology would need innovative counselling and education. However, the first task would be to ascertain the extent of their dependence on the resources that need to be conserved.

Survey

The state of Himachal Pradesh, which is entirely mountainous and predominantly rural (India 23.17% urban, 76.29% rural, Himachal Pradesh 7.61% urban, 92.39% rural) was considered suitable for study. It was further observed that the District of Kullu (5503 sq.km.) with a population of 238,734 persons in 1981 distributed over 169 villages and three urban areas approximated the state average in terms of rural-urban population ratio and average growth rate of population. The District is located in the center of the State and presents a variation of altitudes similar to the entire state average. The District thus offered a replicable model for study.

The objective of the study was to:

1) Identify the existing energy consumption pattern, and if any, relationship between other variables such as altitudes, accessibility, agricultural land holding, livestock, etc.

2) Identify energy sources including distance to the source and the time taken to complete a journey, and estimate the viability of bio-mass to sustain the present level of consumption.

3) Identify existing technological innovations indigenously carried out and possibilities of adoption of new technologies.

Choice of Sample

All the 169 villages were graded according to population class, altitude zone, locational and accessibility attributes. Levels of provision of social and civic amenities and information regarding water supply, power availability, and transport facility were classified in terms of altitude and accessibility zones. However, the general index of population distribution and infrastructure availability at the village level do not provide a discernable pattern of energy consumption nor the level of deprivation. Therefore, a sample of villages had to be investigated in detail.

The underlying hypotheses in the choice of villages were:

1) Energy consumption is likely to vary according to variation in altitude.

2) Topographical factors would have a considerable impact on the pattern of agriculture.

3) Orientation would have a direct bearing on the location of buildings and level of consumption of building materials.

4) Accessibility would have a considerable influence over energy utilization and option of sources.

Based on the above, villages in the same altitude range were chosen with differing characteristics of 1) accessibility, 2) topography, and 3) nearness to river sources. A questionnaire was formulated to elicit information on the following per family:

1) Economic activities, such as: a) location and quantity of agricultural land and amount of cultivable land, b) quantum of agricultural produce, c) number of livestock, d) employment in areas other than agriculture, particularly seasonal and in handicrafts, and e) family income and expenditure pattern.

2) Household composition, such as: a) number of people, b) number of male, female, children, c) age composition, d) number of earning members, and e) members of household working outside the village.

3) Amount of energy consumed, such as: a) bio-mass (fodder and fuelwood), b) electricity, c) kerosene and others, d) distance travelled to procure bio-mass and reach other social amenities, e) use of wastes, and f) use of renewable technology.

Apart from the questionnaire survey, notes were taken of the following:

1) Distribution of population within the village with particular emphasis of relationship of agricultural land and dwelling units.

2) Relationship of the village to surrounding countryside especially forest land.

3) Orientation of the village in relation to sun and wind.

4) Characteristics of topography.

5) Construction techniques of buildings and their relationship with energy consumption.

6) Rate of change in villages in terms of area.

Findings

The smallest unit of settlement is a hamlet, consisting of 2 to 20 dwelling units. Each village consists of a number of hamlets and is spread over an area of 3-4 square kilometers. Seventy-five percent of the villages spread over an altitude range of 300 to 700 meters. As a result, though they may be dependent on the same forest bio-mass, they rarely depend on the same source of water. The rivers make a direct contribution as a water source for the purpose of milling of corn and sawing of timber. Drinking water is generally drawn from natural spring, etc. All hamlets have at least one community tap. External inputs such as civil supplies (kerosene, sugar, edible oil, cloth, etc.) find focus in a hamlet which is most accessible by road, whereas the hamlet which is most accessible within the village acts as a central focus for other socio-cultural amenities, such as, schools, temples, etc. Thus, the villages are twin nucleated. Distribution centers, operated through fair price and cooperative stores, cater to a number of hamlets and have an approximate catchment of 6 km. radius and they are generally located on vehicular routes.

Agricultural activity is generally dependent on rain-fed irrigation. Degree of slope determines the size of land holdings and the average size of holding per family. However, no variation in consumption of bio-mass was observed due to land holding size. On the other hand, it was found that the agricultural residue supported milk cattle during the winter. Thus a fodder store is part of building architecture. The gentler slope areas supported greater numbers of cattle per family, which provided them with higher economic status.

Every village has been provided with an electricity connection by a central network of electric cables. The rates charged for domestic consumption is quite low and results, on average, in a monthly bill of Rs.10-15. However, this electricity is used for lighting two 40 watt bulbs only and occasionally to run a radio. Villagers do not see electricity as a source of space heating or cooking, but they certainly view the use of electricity as an energy source for irrigation and running of industries. Kerosene, on the other hand, is viewed as an emergency fuel as an alternate light source, and a small quantity is used to light firewood. Liquid petroleum gas is available in transportable containers, but they are out of the economic reach of the villagers. Not a single villager was found to be using them. Coal is not delivered in this area.

All villagers view fuelwood as a free source of energy, although they spend, on an average, 4-6 hours to collect it from the surrounding forest. While the hamlets located around 1,800 m. altitude consume fuelwood at the rate of 15 kg. in summer and 30 kg. in winter, hamlets located at an altitude of 2,300 consume 30 kg. in summer and more than 100 kg. in winter per household.

It was observed that the major consumer of fuelwood at the moment is cooking and space heating. All buildings are very poorly insulated. As a result, they are unable to retain heat and this results in greater than necessary fuel consumption. The 'chullah' (ovens) and 'tandoors' (fireplaces) are fuel inefficient. The kitchen is invariably located in the attic, so the rest of the building gets no advantage of the heat produced during cooking.

The pattern of building construction is more or less uniform through the district, using the same kind of technique and materials. Wood, stone, and slate are the basic building materials, all locally derived. Each family is allowed to fell two trees per year for repair and construction of houses. Obviously two logs are insufficient for any new building, so the timber is pooled by the community. Since the timber does not go through any process of seasoning, its lifespan is short, requiring frequent replacement. The sections used are far heavier than necessary. The doors and windows are poorly constructed and allow considerable leakage of air. The slates used for the roof are rough hewn, leaving yawning gaps. As a result, energy consumption for space heating is very high in winter.

Since all villages are entirely dependent on bio-mass for cooking fuel and heating, it is important to estimate the quantum of bio-mass necessary if the present rate of consumption is continued. Although there are several methods for estimation of bio-mass requirement, using the available data, the litterfall method was adopted. Villagers interviewed said that litter is mostly used for fuel. Litter includes both leaf litter and branches and twigs. Considering the climatic condition and forest type, litter was taken at 3,100 kg/ha/year of which 30% was attributed to twig and branches. Extrapolating the population with consumption, the yearly requirement of forest area was worked out. It was found that most of the forests would require to expand by 22% to 65% in an area depending on population. It thus becomes apparent that neither at present, nor in the future, will the forest be in a position to support the fuel or construction material requirement of the people without serious threat to its denudation.

Observations

Logically, it could be derived that dependence on the forest by the mountain villages has to be reduced to a great extent, without necessarily causing hardship, by adoption of various alternate and appropriate technologies.

It was also observed that the villagers were very receptive to new ideas, provided they were demonstrably applicable. For example, villages below the altitude of 1,500 m. have begun to use bio-gas as an alternate fuel. Nearly 4,000 bio-gas plants have been installed so far. Similarly, improved cooking stoves would be popular if they were cheap and functional. Some varieties, which are not very well designed, are being used by some households.

However, it was found that villagers were ignorant about use of solar energy, such as solar water heaters, solar cookers, or photo voltaics. Considerable thrust is necessary in educating the people in the use of these technologies; at the same time, these have to be made cost effective. Similarly they are ignorant about the possibility of generating electricity through water power. It should not be too difficult to train people in the operation and maintenance of micro-hydel, as is being done in Nepal.

The field of building construction needs major emphasis in experimentation and education. We found a few instances where people who have been exposed to the outside world have constructed houses in non-traditional ways, using less material, although with unfortunate aesthetics. It is necessary to train people to season timber (maybe by solar kilns), use lighter sections, and insulate the buildings properly. This is likely to have significant impact on energy consumption.

Conclusion

Education for simple village people should manifest through tangible solutions. They are curious and receptive to new ideas. Ability to learn even complex technology, if it demonstrates its effectiveness, is high. Sustainable development can only be ensured with demonstrative applicability of alternate technologies.

Soviet Environmental Education: Formal and Informal Approaches

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Abstract

This paper will explore the form, content, and political economic context of Soviet environmental education. It will focus on the curricula of secondary schools, certain select institutions of higher learning, the All-Russian Society for the Protection of Nature, and the educational programs at representative nature preserves (Zapovedniki). The theory and underlying ideological assumptions of the Soviet approaches to environmental education will receive special emphasis. The paper will also show how glasnost' and perestroika have affected environmental education. Glasnost' has emboldened the 10-million or so members of the All-Russian Society for the Preservation of Nature, who now routinely report polluting economic enterprises to the authorities, while perestroika aims to create an atmosphere more conducive to resource conservation.

Educational Issues in International EE
Computer Conferences: An Australian Experience

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Abstract

International computer conferences hold promise for more interactive expressions of the "Thinking Globally, Acting Locally" concept. But ongoing local research by teacher participants is required into context-dependent educational issues associated with such cooperative ventures.

Introduction

Seven schools in the state of Victoria in Australia are participating in an environmental education project that has three phases:

1) The teachers and students are engaged in an environmental education program that entails systematic testing of water quality in nearby freshwater and marine environments.

2) The teachers and students are participating in an international computer conference that enables interactions with some 100 schools in three countries, all of which are engaged in much the same environmental education program.

3) The teachers and university faculty are engaged in a form of participant research that focuses on educational issues that arise as efforts are made to develop the first two phases of the project.

This paper will provide a descriptive outline of the overall project and present some of the teaching and curriculum issues identified so far in the project.

Project Participants

Of the seven schools involved in the project, three are K-12 in structure; the others are secondary schools. Several of the schools are relatively isolated, with small class size. In each case, middle to upper secondary students were involved in the project. All participating schools are located nearby or on the southeast coast of Australia.

In addition to the Australian schools, some ninety overseas schools, are participating in the project. All participating schools are engaged in activities based upon tests of water quality which form the substance of the schools' environmental education programs.

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Deakin University provides the "gateway" to the overseas schools via its mainframe computer. The schools log-in to the Deakin mainframe and from there communicate via satellite to the University of Michigan, whose mainframe holds the actual database of the conference. This two-step process enables schools in any remote area in Australia to communicate directly about their environmental scientific studies with any of the overseas schools. This second phase of the project enables students to do several things: to contribute technical water quality data, to obtain needed methodological advice, to gain assistance in the interpretation of technical data, to gain contextual information about the sites where testing is being conducted at other locations, and to establish enduring personal/professional contacts. The turnaround time for messages and replies is a day or two, so the conference represents a rich and varied source of immediate support.

In addition to acting as a "gateway," Deakin University provides a support structure to the Australian schools — for example we provided several schools with the latest field equipment. We also encouraged collaborative record-keeping for participatory educational research into the teaching and curriculum issues as the teachers themselves experienced them. Some of the specific approaches to data collection used so far include personal diaries, computer terminal logbooks, interviews, analysis of computer discourse, and photography.

Four Educational Issues in this Example of a Computer Conference in Environmental Education

The conference paper will outline four issues that have arisen in this project and which may have more general currency in situations where attempts are made to employ computer conferences in environmental education.

1) Enquiry teaching — the tension between teaching environmental education as enquiry and conventional didactic teaching styles.

Attempts at teaching environmental education as enquiry (that is, creating the conditions for pupils to exercise a measure of autonomy in mounting a critique of the value positions inherent in environmental decision-making) are frequently confounded by the status of the teacher in the classroom. In particular, while the teacher is necessarily perceived as an authority figure, this can interfere with efforts at encouraging students to engage in enquiries that are independent of the teacher. The teacher's perspective on an environmental issue is frequently sought, and uncritically accepted, because students are in the habit of being directed (in a classroom managerial sense, at least) by teachers.

In the current project, one of the teaching issues that arises is how the computer conference is regarded by students — as just another source of authoritative information to be accepted uncritically, or as an interactive community offering the capacity for the critical "testing" of propositions of various kinds by an expanded community of peers. Does the availability of almost immediate relevant information and procedures through use of the computer conference "take the pressure off the teacher," allowing him/her to refrain from acting as the authority on the substantive environmental issues being addressed? In brief, how does the availability and use of the computer conference affect the common tension between teaching style and "environmental education as enquiry?"

2) **The conference as an expansion of the community of enquirers.**

It is clear that the conference has the potential to act as a needed professional support structure to students engaged in this instance of environmental education (that is, water quality monitoring). The environmental education program is multi-faceted, with identifiable social, political and scientific dimensions. However, the routine work of the project is largely of the environmental science kind: students carry out a systematic study of water quality using a standard battery of nine water quality tests. So it is important to consider the ways in which the availability of the computer conference interacts with or influences the view of science being promulgated (explicitly or implicitly) in this project.

3) **The project as "Science, Technology and Society" (STS).** Given the rising interest in "Science, Technology and Society" in Australia and elsewhere, it is important for environmental education to consider its relationship with the STS movement.

4) **Kinds of use of the computer conference.** Students are able to interact with the computer conference in a range of ways. Some of these forms of interaction are cited below:

-- **initial introductions** of new users to other users: teachers and students have keyed in some statements describing themselves, their school and its setting for the benefit of other conference users.

-- **personal bonds between users:** users appear to feel the necessity to establish and maintain an almost personal bond with peers using the conference — a bond that is in many cases independent of the substantive work of the project (in this case, water quality testing).

-- **exchange of geographical context information:** from a fairly freewheeling description of the school and its context, users seemed to move to a more considered and detailed/specific description of the water catchment area that their school is located in, and an outline of the water quality issue as they perceived it at the time.

-- **enhancing other aspects of the curriculum:** in several cases, the conference was used as a forum for establishing and maintaining useful links with individual schools with a view to serious collaborative exploration of an idea completely separate from the water quality enterprise.

-- **establishing new networks** and contacts between teachers and students.

-- **solving methodological problems:** students and teachers alike used the conference as a source of information to clarify early problems and uncertainties about how to do the tests.

-- **accessing the data base:** one of the main purposes of linking the water quality work with the computer conference was to enable students to exchange information of a technical kind with other students carrying out similar kinds of environmental education enquiries.

-- **interpretation of data:** the conference was used as a forum for validating certain results and for gaining assistance in interpreting the significance of results.

-- **classroom process considerations:** there were some instances where teachers sought assistance with issues concerned with the actual teaching of the water quality environmental education program and its associated computer work. One of these issues concerned emerging gender roles in the conduct of project work.

Conclusion

Although this project has been operating for a year now, it is still at an early stage. The task of developing expertise in computer conferencing in environmental education is, it appears, necessarily a protracted one. The project is only beginning to address issues of the kind listed above.

It is also true that the process of participatory enquiry is problematic. The role of the teachers in participatory enquiry is supported by a Project Newsletter and Debriefing Workshops at which participants report on the technical, teaching and curriculum issues that have arisen to that point, with a view to collaborative planning of strategic classroom research into means of dealing with these issues.

Natural Resources/Environmental Education in Denmark: A Fulbright Study Report

Nancy L. Zuschlag, Fulbright Scholarship Recipient 1984-85
Colorado State University Cooperative Extension
Golden, Colorado

Abstract

Denmark has long been a country on the creative "cutting edge" of environmental education. This session will outline the administration of and provide example materials from major natural resources education facilities and programs found in Denmark.

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Strand 5

Curriculum and Teaching Strategies

What Do People Think About Wildlife? A Multi-Media Approach to Middle School Computer Essays

Carol Bergevin
Heaton Middle School
Pueblo, Colorado

Abstract

Middle school students are encouraged to distill their own opinions on wildlife with this unique teaching strategy that encorporates Indian myths, expedition journals, movies and computer simulations about pioneers, Project WILD ethical dilemma activities, newspaper articles debating Boulder's community greenbelt, guest speakers and career-shadowing.

Environmental Physics: An Adapted Curriculum and Teaching Strategy for Non-physicists at the University Level

Armel Boutard
Département de physique
Succursale A, Montréal, Québec

Abstract

"Environmental Physics" is a course which, if it focuses on the qualitative aspects of physical concepts, may be adapted to the needs of a general population of undergraduate students. Environmental conservation (or restoration), through critics of individual or collective human values, attitudes and behaviors, adds an important transdisciplinary aspect to the course design. In essence, Environmental Physics may be a "Physics for all" course, with no needs for prerequisite scientific training.

The nature of the problems threatening our biosphere is related to man's actions. Scientific and technological "components" and their uses overflow the man-made environments and upset the homeostasis of formerly undisturbed natural ecosystems. Technology is part of our cultural environment, and plays and important role in the molding of individual and collective values and attitudes.

Accordingly, one may conclude that some fundamental topics from environmental physics and related physical sciences be part of any environmental studies at the university. An awareness to the needs of environmental conservation may ensure that tomorrow's graduates, rather than adding to the problems, will help solve the dilemma of an apparent incompatibility between man's wants and Earth's needs.

Environmental Physics: Its Disciplinary Content

The choice of topics to be included in various specialized fields of physics is facilitated by integrating these topics into major subjects (themes) pertinent to the various needs in environmental studies. It seemed to us that four such integrating themes were sufficient to rearrange and unify the various disciplinary contents: matter, energy, radiation, and "human interactions." (Boutard and Sauvé, 1987).

We will attempt to justify such apparent heterogeneity of integrators. The former theme is of a fundamental nature, leading to the understanding of the different processes of matter's evolution and transformation, and of the basic properties of macroscale physical systems, be they solids or fluids.

The second theme, energy, is the most important science subject in environmental studies (in a matter of speaking "energy is life!"). There is no life without degradation of energy forms through metabolism or exchanges between the various components of an environment. Those various exchanges are of two fundamental kinds, matter transfer and radiative processes. Environmental physics should cover the physical interactions that consist of some forms of radiations, parts of the electromagnetic spectrum (x-rays, infrared, microwaves, etc.), or parts of a mechanical energetic transfer as sounds and vibrations, not including other mechanical interactions.

The fourth theme is related to man's relations with different components or elements of his environments, namely, 1) the environmental abiotic factors and quality of habitats, 2) the senses and sensations with all their bionic applications to greater ranges or protheses designs, 3) the effects of nuclear and electromagnetic radiations or mechanical interactions (health physics), and 4) the individual and collective human interactions which influence the quality of environee-environment relationships.

Environmental Physics: A Transdisciplinary Context

The cognizances of all the scientific intricacies involved in the concept of environment are not sufficient to assure environmental conservation. One must know more about human values, attitudes and behaviors. It is necessary that the conservation of Earth's intrinsic qualities supersede any human egotistical behavior. As such, environmental physics reaffirms that no scientific or technological "fix" may be substituted to the needs for changes in our behavior and control of our individual and collective egoism.

Accordingly, environmental physics must include the general knowledge necessary to comprehend human's impacts on the biosphere. It must critique individual and collective values and attitudes, and it must lead to a reflection of one's behavior in relation to one's professional career. As such,

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one of the most important characteristics of environmental physics, or of any of the environmental sciences for that matter, is its transdisciplinary approach to problem solving.

Environmental Physics: A Physics for All !

In the framework of global competition between elective subjects, we have to be aware of students criteria for classes selection, such as the workload required in order to get a set mark and perceived utility of the course (in a rather short term). We must then develop a specific pedagogical strategy that maximizes the perceived utility of environmental physics, thereby making it motivating and accessible to the students in relation to the process of evaluation.

Such needs became evident to us when we noticed an important drop in the initial enrollment in several classes. In fact, data compilations over the first 20 full courses revealed that students did fail or drop late in the course at an average of 16.6%, another 20.6% of them passed with less than satisfactory results ("D" mark). The majority of the students in this predicament were from the Humanities program, and we might have reinforced the stereotype of what a scientific course and teacher represent for those students: elitism, aggression, stress and devalorization. That situation was counterproductive, considering again our belief that any student, with enough motivation, will acquire useful knowledge in physical sciences, knowledge adapted to environmental studies. Moreover, we would reiterate that environmental physics must be a "physics for all!" (Boutard, 1988).

Contrary to what one may think, mathematics are not a hindrance to the teaching of environmental physics. They are pivotal to the quantitative analyses of specialized training, but are not a prerequisite to the qualitative understanding of physical concepts. This clarification does not deny that there is inherent difficulties associated to most of the scientific aspects of environmental problems. But, according to Brown (as stated in Begin, 1980), most students are so similar that in favorable conditions, they are apt to reach the pursued objectives and to acquire the stated abilities. For Brown, favorable conditions may not be natural aptitudes but readiness in the form of prerequisite training. More interesting to us was the fact that the lack of adequate preparation may be supplemented by an increase in time study. We did design a pedagogical strategy that reinforced students motivation: "tune-up workshops, step-by-step process of evaluation, teacher accessibility, production of extensive notes, etc. (Sauvé and Boutard, 1988; Boutard, 1988). Data compilation for the last three full courses under the new system shows an improvement in the students overall achievement. The ratio in failure and late dropout fell to 5%, as was the case for the "D" mark (9%). The overall "great success," "A" and "B" marks, rose from 41.2% to 56%. But more interesting was the increase in the student population from

Humanities (nearly 44%). The majority of the students (53%), not having much of a scientific background, nonetheless, did very well.

A multidisciplinary team is now in the process of repeating our work for the disciplinary fields of chemistry and geology. We hope to develop and environmental physical sciences curriculum which may consist of "federate" topics drawn from the unified subjects specific to each discipline.

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The Great Outdoors!

Sue Brandon
Jefferson County Public Schools
Golden, Colorado

Abstract

Participate and take away an activity from this integrated third through sixth grade environmental program developed by a large metropolitan school district. "The Great Outdoors!" has been implemented in 85 elementary schools. This is a hands-on, minds-on program.

Curriculum and Teaching Strategies

Kathy Burcham
Bethoud, Colorado
and

Pattyanne Corsentino
Denver, Colorado

Abstract

You are invited to attend an adventure into a curriculum jungle full of ideas for outdoor education. Infusing programs such as P.L.T., CLASS Project, P.W., and a variety of other environmental programs into middle school curriculum will be explored. Presenter's units, projects, and other materials to invite learning will also be captured for your viewing.

From the Pines to the Alpine: Techniques to Teach about Mountain Life Zones

Leslie M. Cancilla
Keystone Science School
Keystone, Colorado

Abstract

An interactive workshop demonstrating teaching techniques for the field and classroom. Explore the distinct life zones of the Rocky Mountains. From the foothills to the alpine, take your students to the top with these practical activities!

Global Perspectives: The Periwinkle Project

Skid Crease, Program Leader
Mono Cliffs Outdoor Education Centre
Orangeville, Ontario, Canada

Abstract

How to focus on entire board, from discipline coordinators to teachers, on establishing a relevant curriculum dealing with global perspectives/ environmental issues. Discover a positive action plan to move from vision to reality.

Walk a Mile in My Shoes... Teaching Strategies for Encouraging Empathy Towards the Natural World

Rosi Dagit
Internation Student Research, Inc.
Topanga, California

Abstract

How do we pass on to others a feeling of concern for the natural world? Successful teaching strategies including simulation games, interactive research and interdisciplinary projects will be presented for discussion. Copies of materials available to participants.

Description of an Interdisciplinary Action Model Applicable in Elementary and Secondary Schools

Dr. Charles De Flandre, Professor
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Abstract

A team of researchers at the University of Quebec in Montreal have developed an interdisciplinary model for change based on problem solving strategies. This model is integrated in the school curriculum and the disciplines serve as tools to solve global problems, which may or may not be relative to the environment. Our assumption is that to being about long-term changes in the attitudes of the students toward environmental problems, it is necessary that projects relative to environmental education be integrated in the school curriculum (elementary and secondary). Teachers must feel secure that through interdisciplinary projects, they can cover the behavioral objectives of the curriculum. In the school, teachers also need to be trained on how to apply the disciplines in these projects and how to reorganize their classroom environment to facilitate their implementation. The speaker will present the model, some applications, and will illustrate how the disciplines are integrated, particularly mathematics.

Recent Wisconsin Initiatives in Environmental Education: What Has Happened Since 1986?

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Abstract

This paper will discuss the revised edition of Wisconsin's EE planning guide, elementary level EE minor standards, a proposed EE coordinating council, and a proposed Wisconsin center for EE and EE grants program.

The purposes of this paper are to: 1) report on progress made in implementing four initiatives discussed in "Recent Wisconsin Initiatives in

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Environmental Education" (Engleson, 1986), a paper presented at the 15th Annual NAEE Conference in Eugene, Oregon; 2) report additional initiatives undertaken since 1986; and 3) to identify possible future initiatives.

The 1986 paper discussed:

— A teacher certification rule affecting candidates for initial certification in early childhood, elementary, agriculture, science, and social studies education;

— The publication of A Guide to Curriculum Planning in Environmental Education (Engleson, 1985);

— An environmental education curriculum planning requirement; and

— Standards for programs leading to secondary certification in environmental studies.

At the time, each of these initiatives was relatively new and I indicated that the further development and implementation of these initiatives has and would continue to depend on the willingness of all Wisconsin educators to accept responsibility for working to accomplish them.

Current Status of the 1986 Initiatives

Wisconsin educators have accepted this responsibility and it can be reported at this time that the implementation of the four 1986 initiatives has progressed extremely well.

Initiative one, the teacher certification rule, is achieving results even better than those expected. Students, initially reluctant to embrace and recognize a personal need to improve their abilities as environmental educators, are reported on many campuses to be responding with enthusiasm to the courses they are required to complete. In situations where a dynamic teacher is involved, students are describing these courses as the best taken in their entire university program!

Initiative two, the publication, A Guide to Curriculum Planning in Environmental Education, has been a huge success. About 12,000 copies have been sold throughout Wisconsin, the United States, and 28 other countries. Even so, a number of deficiencies have been identified in the publication and it is undergoing a complete revision, the nature of which will be described later in this paper.

Initiative three, the curriculum planning requirement, has been amended. The original requirement called for K-12 plans in 12 curricular areas, including environmental education, to be completed by September 1, 1988. The amended requirement calls for three such plans by that date, three more by September 1, 1989, and the balance by September 1, 1990. As before, environmental education objectives and activities must be integrated into all these curriculum plans with the greatest emphasis in art, health, science, and social studies education. Educators, at first apprehensive about this requirement, have responded with enthusiasm as they have gained an understanding of the requirement's intent not only to teach about the environment, but to enhance the achievement of existing curricular goals.

The fourth initiative, dealing with secondary certification, is proceeding extremely well although not many students elect this option. Currently the University of Wisconsin-Stevens Point offers an environmental studies major and minor, and the University of Wisconsin-Green Bay an environmental studies minor.

New Initiatives

A) A Guide to Curriculum Planning in Environmental Education. The previously mentioned revision of A Guide to Curriculum Planning in Environmental Education is extensive enough to include it here as a new initiative. The revised guide will include:

1) The use of the phrase "education about the environment" rather than the term, "environmental education," in order to reorient thinking away from "separate entity" thinking to "pervasive element" thinking.

2) A section dealing with the five subgoals of education about the environment: Awareness, Knowledge, Attitudes and Values, Citizen Action Skills, and Citizen Action Experience. Each of five subsections will "define" a subgoal, discuss its relationship to the Taxonomy of Educational Objectives: Cognitive Domain (Bloom, et. al.) or Taxonomy of Educational Objectives: Affective Domain (Krathwohl, et. al.), provide illustrative instructional objectives, and provide other important information about the subgoal.

For example, subgoal: Awareness is stated:

> To help students develop the ability to perceive and discriminate among stimuli; to process, refine, and extend these perceptions; and concurrently acquire an aesthetic sensitivity to both natural and built environments. (Engleson, 1989).

Awareness is further "defined" as:

> That which occurs when a stimulus, a sensory input from outside the body, is combined with thoughts and feelings inside the body to produce meaning. (Engleson, 1989)

Awareness is then related to the two lowest levels of the Taxonomy of Educational Objectives: Affective Domain, and optimum conditions for the development of awareness are described. This is followed by a detailed discussion of the first two elements of the subgoal statement, perceiving and processing, identifying process skills, i.e., observing, which constitute the two phases of awareness development. Each process skill is defined and illustrated with several objective statements. The subsection ends with a discussion of the aesthetic component of awareness and the relationships of this subgoal to others, especially knowledge and citizen action skills.

3) A section, "A Theoretical Base for Education About the Environment," to provide a rationale for the "Wisconsin Curriculum Model for Education About the Environment." (Engleson, 1989).

Wisconsin Curriculum Model for Education About the Environment

Grade Level Range	Subgoals: Major Emphasis	Subgoals: Minor Emphasis
K-3	Awareness Attitudes and Values	Knowledge Citizen Action Skills Citizen Action Experience
3-6	Knowledge Attitudes and Values	Awareness Citizen Action Skills Citizen Action Experience
6-9	Knowledge Citizen Action Skills Attitudes and Values	Awareness Citizen Action Experience
9-12	Citizen Action Skills Citizen Action Experience Attitudes and Values	Awareness Knowledge

Developmental, behavioral, and wholistic theories of cognitive and moral development are utilized in this rationale.

4) Sections on curriculum planning, instructional strategies, and evaluation.

B) Environmental Studies Minor in Teacher Preparation Curriculum. Another new initiative is directed at students graduating from elementary or middle level teacher preparation programs after August 30, 1992. These students must select a minor of at least 22 semester hours from ten designated areas, one of which is environmental studies. The proposed standards for this minor deal with:

1) Natural resources and their conservation;

2) Ecological principles;

3) Energy in physical systems;

4) The history of people and their environmental interactions;

5) Problems of continued human population growth;

6) Relationships between science, technology and society;

7) How people-environment interactions affect physical and mental health;

8) Teaching for environmental awareness and sensitivity;

9) Techniques of environmental values education;

10) Cognitive educational methods which help students understand how Earth functions;

11) How to teach issue investigation/resolution skills; and

12) How to integrate teaching about the environment into all areas of the curriculum.

C) Wisconsin Environmental Education Coordinating Council. A third new initiative is an attempt to promote and coordinate environmental education throughout Wisconsin. Legislation has been introduced which would create a Wisconsin Environmental Education Coordinating Council, a body comprised of broad representation from all facets of environmental education both formal and nonformal. The Coordinating Council would oversee two major programs, the first being a Wisconsin center for environmental education. This center, probably attached to the University of

Wisconsin-Stevens Point, would have a director, an educator with expertise in elementary education, and an educator with expertise in secondary education. The primary function of the center would be to work with schools in developing curricula and preparing teachers, but it would also prepare an ad hoc faculty of educators all over the state to do the same.

The second program that the coordinating council would oversee is an education grants program. The council would annually identify priorities for environmental education and establish criteria for granting funds to develop and implement programs dealing with the priority areas.

A total of about $500,000 has been recommended to implement this initiative.

Future Initiatives

Planning for two future initiatives is just beginning. There will be a statewide effort to plan the celebration of Earth Day 1990, which will serve as a kickoff activity for the World Decade for Environmental Education, 1990-2000. Along with existing initiatives, these new initiatives will foster and expand environmental education opportunities for all Wisconsin citizens as they enter the Twenty-First Century.

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Traveling Science Camps for High School Students

Richard Fulton
Mancos, Colorado

Abstract

This workshop will outline the development, administration, and logistics of a traveling science camp for junior and senior high school students, with examples of developed course curricula, contacts, and itineraries.

Take a moment to reflect on your most influential learning experience. Chances are the most memorable learning experience was a time outside of school, when you were able to discover something for yourself, or when you experienced something for the first time, forming an unforgettable change in your perception of life. Isn't this what education is supposed to be all about? Isn't this what environmental education is all about?

Travel education, which could be called a branch of environmental education, attempts to create memorable learning experiences and broaden teaching opportunities by taking students and teachers to completely different environments than the school classroom. The travel education concept provides an alternative to traditional education. This alternative method of education brings concepts, students and teachers together in a new and dynamic way. Students travel in the real world, where they experience firsthand the realities of science, art, math, history and English in their studies and daily life. Teachers become involved with an interdisciplinary "classroom," teaching by noting real life events rather than worksheets in 50 minute blocks. Teachers also become counselors to a new wholistic student with a range of personal and social as well as academic needs. Students are motivated by new experiences and increasing responsibilities to self and group as they cope with the feeling of being away from the safety of home and traditional school.

What exactly is a travel education program? **Travel education is simply a well planned multi-day or multi-week field trip that takes students from the classroom to the real world.** Using local school district vans and a team of local teachers and students, a travel education program would, for example, visit interesting city and rural areas studying particular themes. The course of study can be designed by teachers, students, parents or a combination of all. Travel education reinforces customized reading and writing assignments with hands-on activities and real life experiences.

Group cooperation and development is a key component of travel education programs. Individuals in the group work together to share chores such as cooking, van maintenance, packing and unpacking, and other camp or lodging chores. A group would often camp in state and national park campgrounds depending on the seasonal conditions, as this reduces costs and brings the group together. For winter travel, lodging can be arranged in community schools, churches, and county facilities that become home for school group travelers.

In summary, travel education combines the joy and companionship of summer camp and the excitement of learning that schools provide.

Why Travel Education?

The main philosophy of travel education is based on the belief that learning is best accomplished from real life situations and by motivated learners and instructors. Travel education places the students and teachers in the real world together. From discovering how a starfish moves on your arm and the size of the turbines at the Glen Canyon Dam, the process of learning takes on new and wholistic interpretations. No longer is a starfish or a frog an isolated animal in a cold, metal pan on a desk in a classroom. Instead they become part of a highly, complex ecosystem. No longer are teachers 55 minute dictators of directions, time and seating charts, but motivated and involved learners in the curriculum. No longer are students passive followers of directions and ideas, but leaders of creative personalized learning experiences. Students and teachers become involved with questions, not just answers. In fact, everyone and everything becomes involved in the process of education.

Special events occur when teachers and students venture out into the world outside of the school building. Consider the following observations I have found while involved in travel education programs:

1) **Students start to ask incredible questions.** After a geology class at Navajo National Monument, a student asked me, "Are those sand dunes a result of an ancient sea deposit or erosion from the rocks that were ancient sand dunes?" The level of critical thinking in the real world is refreshing and exciting for students and teachers.

2) **Students and teachers develop new relationships.** After miles of driving across western Oregon, our group stopped at a small town park and played on swing sets and seesaws like young children. Spontaneous fun on trips can bring people from varied backgrounds together and provide great memories.

3) **Students and teachers gain respect for each other.** After a morning visiting an inner-city school in Denver, I had a meeting with my students and allowed them to take the public buses to a large shopping mall

while I stayed to talk with the other teachers. Gaining trust inside school buildings is difficult at best, yet on trips, trust becomes essential.

4) **Students and teachers appreciate when learning is fun.** After taking a group of students rafting in southern Colorado, everyone of those students agreed that was the most fun they had had in a long time. Giving and receiving appreciation for work well done and having fun are essential ingredients in creating a successful school and work environment.

As the nation, states and localities look to restructure our schools to provide the best education for our youth, including an awareness of the environment. I would like to recommend travel education. No, I don't see an end to traditional settings. I do, however, envision a portion of a child's education including the real world, where there exists real problems to solve, not just the odd numbers on pages 238 and 239. If you share this vision and would like to understand the nuts and bolts of operating a travel education program in your school or district, please contact me, Richard S. Fulton, Travel Education Consultant, P.O. Box 602, Mancos, Colorado, 81328, 303-533-7225.

Utilizing the Tradition of Nature Writing

Dr. Owen Grumbling
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Abstract

The presenter, editor of a critical anthology of nature literature in England and America, will demonstrate how writers such as Wordsworth, Thoreau, Fowles, and Leopold and enlighten the implicit attitudes underlying discussion of environmental issues.

Public policy discussions of environmental problems, as we know, are regularly carried on in the language of economic benefit. The "cost-benefit" decision in matters of risk to human health, to take one example, balances quantification of financial interest against the value of human life in the aggregate, according to a quantified probability factor. In effect, this process of decision-making about the act of pollution demonstrates a relationship to the biosphere that Thomas Carlyle called "the cash nexus" when describing the economic connections that came to dominate, and, he argued, to degrade human relationships in Victorian England.

Today the understanding of non-human nature as simply a "resource" is pervasive, not only in current public policy discussions, but in our conception and even our perception of the environment. Regularly in the public policy decision-making process we are led into debates about the choices between "jobs and the environment." To preserve a pristine estuarine system, for example, or to preserve a particular "obscure" species, requires either that we argue an anthropocentric benefit, or that we find new language to defend the intrinsic integrity of the organism or system.

Even when the anthropocentric benefit is essentially aesthetic, it often is argued in baldly economic terms, such as the tourist revenues consequent to human enjoyment of the aesthetic good—revenues that will accumulate to some particular interest.

Anthropocentric arguments, however, might be divorced from economic assumptions if based upon a more profound conception of benefit: aesthetic appreciation that transcends consumption. One problem is to articulate the intrinsic value of that aesthetic appreciation in terms that speak to concrete personal experience.

To entertain concrete personal experiences of the natural work is to enter the realm of imaginative literature. There is a distinct tradition of nature literature, I have argued elsewhere, in which "persons distant in time and place observed acutely, thought deeply, and wrote artfully, informs that continue to delight, about the natural world that surrounds and nourishes us all." (Grumbling and Begiebing, 1989).

The task of environmental education in the schools, according to David W. Orr, (recently appointed education editor of Conservation Biology), "...is to foster ecological literacy, competency, and **a sense of care** among its graduates. (My emphasis) He argues that "we can discover linkages between conservation biology and other disciplines in the humanities and social sciences ... By what is included or excluded we teach students that they are part of or apart from the natural world." (Orr, 1989)

The "sense of care" may be fostered effectively through the tradition of nature literature. But the evolution of nature interpretation seems to have "eliminated the nature writer, who is the middle man," according to Steve Simpson (1988), who argues that it is time for outdoor educators to "direct new efforts towards basic education, especially toward the teaching of literature" and even attempt to "introduce themes of stewardship and environmental ethics into the classroom." When individuals encounter thoughtful personal accounts of the natural world, they are spurred to create their own personal philosophies of care. Because nature literature is value-laden and value-generating, it is, I would submit, as important as ecological literacy, public policy critique, and field experience, from which it should not be excluded but integrated.

The tradition of nature literature provides tools with which environmental education at various levels can question the basic attitudes of anthropocentric financial utilitarianism discussed at the outset of this essay.

Space limits discussion to only a sampling from the substantial tradition of nature literature. Rather than quote familiar authors, (Simpson discusses texts by Thoreau, Brautigan, and Dr. Seuss), I would prefer to demonstrate the current viability of early modern nature writing in the poetry of William Wordsworth, written two hundred years ago, during the "takeoff phase" (no coincidence) of England's industrial revolution.

Let's return to the problem of valuing a natural system on a non-economic basis. In a poem known as "I Wandered Lonely as a Cloud," Wordsworth describes the personal benefits gained from a chance encounter with a field of wildflowers:

I wandered lonely as a Cloud
That floats on high o'er Vales and Hills,
When all at once I saw a crowd
A host of dancing daffodils;
Along the lake, beneath the trees,
Ten thousand dancing in the breeze.

The waves beside them danced, but they
Outdid the sparkling waves in glee:—
A poet could not but be gay
In such a laughing company:
I gaz'd—and gaz'd—but little thought
What wealth the shew to me had brought:

For oft when on my couch I lie
In vacant or in pensive mood,
They flash upon the inward eye
Which is the bliss of solitude,
And then my heart with pleasure fills
And dances with the Daffodils.

Here the image of a natural community has entered into the permanent consciousness of the observer. The relationship is clearly beneficial to the observer, yet non-consumptive and non-possessive.

A second, more complex poem, titled "Lines Written a Few Miles Above Tintern Abbey," dramatizes Wordsworth's philosophy of nature and has had enormous influence upon the tradition of nature writing. The poem opens with a famous description of the Wye River Valley of southern Wales.

One might observe the scant proportion of humans in this landscape, and perhaps note at least naive conceptions of carrying capacity and sustainable agriculture.

Once again do I behold these steep and lofty cliffs,
Which on a wild and secluded scene impress
Thoughts of more deep seclusion; and connect
The landscape with the quiet of the sky.
The day is come when I again repose
Here, under this dark sycamore, and view
These plots of cottage-ground, these orchard-tufts,
Which at this season, with their unripe fruits,
Among the woods and copses lose themselves,
Nor with their green and simple hue, disturb
The wild green landscape. Once again I see
These hedge-rows, hardly hedge-rows, little lines
Of sportive wood run wild; these pastoral farms
Green to the very door; and wreathes of smoke
Sent up, in silence, from among the trees,
With some uncertain notice, as might seem,
Of vagrant dwellers in the houseless woods,
Or of some hermit's cane, where by his fire
The hermit sits alone.

Once again Wordsworth asserts his recurrent theme, the sustained personal value of landscape in the memory:

Though absent long,
These forms of beauty have not been to me,
As is a landscape to a blind man's eye:
But oft, in lonely rooms, and mid the din
Of towns and cities, I have owed to them,
In hours of weariness, sensations sweet,
Felt in the blood, and felt along the heart,
And passing even into my purer mind,
With tranquil restoration.

But the benign effect of the human encounter with landscape extends beyond mere consciousness, and transcends the merely personal:

—feelings too
Of unremembered pleasure: such, perhaps,
As may have had no trivial influence
On that best portion of a good man's life;

His little, nameless, unremembered acts
Of kindness and of love.

This is an early assertion of an experiential insight clearly understood by environmental educators: that direct experience of natural beauty can result in social good.

But if Wordsworth's poetry has imaginatively validated a non-consumptive, non-possessive, socially ameliorative relationship with nature, one still might ask if it offers potential for enhancing awareness of what Aldo Leopold called "a world of wounds," the degradation committed upon the environment. An answer lies in the powerful narrative poem "Nutting," in which Wordsworth looks back upon his childhood utilization of a resource, wild hazelnut trees, in his native region of England, the Lake District.

After long search the young Wordsworth discovered "one dear nook" where

...the hazels rose
Tall and erect, with milk-white clusters hung,
A virgin scene!

He remembers how he had suddenly (and inexplicably)

dragg'd to earth both branch and bough with crash
And merciless ravage; and the shady nook
Of hazels, and the green and mossy bower
Deform'd and sullied, patiently gave up
Their quiet being.

Even then, he says, though he was "rich beyond the wealth of kings" with his childish treasure,

I felt a sense of pain when I beheld
The silent trees and the intruding sky.

And he cautions his sister to

move along these shades
In gentleness of heart with gentle hand
Touch,—for there is a Spirit in the woods.

Educators and students can question the denotation of the last line: metaphor or reality?—perhaps a precocious intimation of Lovelock's hy-

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pothesis?—but the core reality of the narrative, I believe, resonates in the experience of the reader and clarifies a personal "sense of care."

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EE Action Program Strategies

William Hammond
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Abstract

A review of the major operational theories which address involving K-12 students in group action regarding environmental problems will be shared. A Lee County Schools' "action research-skills-mentorship" action model will be presented and the underlying theory explained.

Environmental Education K-12

Ed Hayne
Oak Creek, Colorado
and
Barb Poulin
Yampa, Colorado

Abstract

This AV/lecture on Environmental Education K-12 includes: building/using nature trails, project WILD, compass/orienteering, stream studies, rock climbing/rappelling, wetland education, winter recreation, survival, primitive skills, plant/animal identification, group interactions, and more.

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K Through 5

The South Routt Elementary School has integrated outdoor education K through 5. Two years ago we received a $400 grant from the State Project WILD Fund. We developed a nature trail area two blocks from the elementary school with that money.

All classes in our school use the trail on a regular basis to aid in teaching their academic subjects. Some subjects covered are the glacial and volcanic activity of our area, historical sites in the valley, classification, soils, plants, insects, birds, and erosion studies. We have done a great deal of soil improvement, landscaping, and grass, tree, and shrub planting on erosion areas as well as on our nature trail and school grounds. Weather is studied through the U.S. Forest Service's weather station. Pollution is studied through an abandoned dump site. Seasons are studied through awareness activities. Many Project WILD activities are used on the trail. Math measurement and classification projects are done using nature as the mode of learning. Art and language art classes are stimulated while communing with nature.

We take the fourth and fifth graders on an extensive pond and stream study field trip — we get in and get wet. These classes are also instructed in survival skill and primitive skills. Some of the primitive skills that the students have been instructed in and participated in are: brain tanning deer hides, making wooden eating utensils, cordage, and tool making. They have only seen demonstrations on flint knapping due to the sharpness of the flakes of obsidian and the possibility of injury.

We study recognition of and treatment for hypothermia. We study survival shelters and what to do when they become lost. We construct and demonstrate the use of solar stills. The students learn what goes into a survival kit and are given extra credit for constructing one for their personal use. The students are also exposed to the proper use of compasses and various types of maps.

6 Through 8

The South Routt Middle School's environmental education program is just getting started. We have used the outdoor classroom concept where it has been practical such as in science and math. It is difficult, due to budget problems, to do a great deal of rapid change at this level.

Starting with the 1989-90 school year, the seventh grade science classes will start a semester class in environmental studies. It is the intention of the teacher to have students work through natural food chains, food webs, and energy pyramids using local examples while allowing as much natural observation time as is practical. In this class the students will study and observe different ecosystems and determine the possible impact by man on these local systems. As part of this class, the students will become involved with the high school students on the wetland project and the trout rearing projects.

The sixth grade unit on geology ends with the entire grade taking a field trip to the area around McCoy to see and study local examples of fossils. The eighth grade earth science class has been studying geology by identifying local deposits of various rock types. This class received a donation, from a local citizen, of fossil-containing rocks and managed to discover several good fossils upon splitting these rocks.

It is planned that either the seventh or eighth grade will become involved with the elementary school camp this fall. These students will be given additional instruction that will allow them to assist with the teaching of certain units at the camp. This camp program will help prepare the middle school student for the high school outdoor education program.

9 Through 12

The ninth grade class is prepared for participation in the outdoor education class by their nine week units on first aid/CPR and orienteering. The nine week unit on first aid is the American Red Cross Standard First Aid class and results in a first aid card for each student that successfully completes the course. The CPR class is the American Heart BLS course and again results in a CPR card for each successful student. The orienteering unit reviews and gives more detailed practice in the use of a compass and a topography map.

The tenth grade prepares for the outdoor education course by completing ecology units in their regular biology classes. These ecology units are worked, as much as possible, in the outdoor setting of the high school.

The eleventh and twelfth grades are eligible to enroll in a semester outdoor education class that covers a great deal of material in the 18 weeks of class. some of the topics are: low impact camping, backpacking, plant and animal identification, track identification, map reading and trip planning, food preparation, fabrics and clothing, outdoor meal planning, snow studies, avalanche studies, cross-country skiing, the maintenance and preparation of equipment, first aid and safety in the outdoors, survival techniques, emergency shelters, snowshoeing, rappelling and rock climbing, working together as a group, developing trust in others, wetland study project, trout rearing project, and assisting the other two schools with their environmental studies programs. The high school program has been operating for about five years in its present format.

The South Routt school system is dedicated to the environmental education of all of their students. The program would not operate without commitment from the school board, the superintendent, the building principals, and the dedicated staff members of the entire system. This program is an essential part of the South Routt educational program.

Highlights of the SAVI/SELPH Program: Environmental Lessons with Special Adaptations for Handicapped Students

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Abstract

The presenter will demonstrate and explain several lessons from the SAVI/SELPH environments and environmental energy modules. Activities are hands-on and provide outstanding learning experiences for all students while emphasizing the multisensory approach.

The Exxon oil spill and its resultant economic costs have helped to renew the general population's concern for the environment. Although the price for publicity is not one environmentalists prefer, there is a sense of anxiety and responsibility for the future which should lead citizens to reexamine priorities and values.

One group of youngsters traditionally short-changed with science experiences and hands-on activities are the handicapped students (Brown 1979). The lack of exposure is compounded by low self-esteem and emphasis on language skills throughout formal educational settings at the expense of time with science and environmental topics. It is extremely difficult for most of these children to ever catch up with normal students because the former have had few direct, experiential, sensory experiences with science equipment and procedures. Environmental educators must not ignore this segment of the learners (estimated to be one-tenth of the population [Molloy 1979]) but work to share meaningful activities with these special students. One program designed to fill this gap is SAVI/SELPH.

The Science Activities for the Visually Impaired (SAVI) and Science Enrichment for Learners with Physical Handicaps (SELPH) programs were developed at the Lawrence Hall of Science, Berkeley, California, through funding by the U.S. Office of Education. Although the original intent was to design special equipment and lessons to aid visually and physically challenged students, this multisensory approach proved highly beneficial for youngsters with other disabilities along with non-disabled students. The philosophical, organizational, and instructional aspects of the program can provide insight for environmental educators interested in improving learning experiences through hands-on activities for all ages and abilities.

Strengths of the approach include guidelines for teachers and simple-to-use equipment. In many teacher education programs, professionals in special education never receive a separate or specialized methods course in science. These teachers lack the skills and equipment to conduct science activities with their special students and, thus, spend more time on other subject areas while the youngsters fall further and further behind in developmental science process skills. On the other hand, regular classroom teachers along with naturalists and others working with the general public seldom receive training and advice which enable them to become effective instructors for special learners. The multisensory approach of SAVI/SELPH along with basic suggestions to teachers will facilitate the professional growth of both groups to meet the needs of a variety of learners.

Two modules of particular interest to environmental educators are "Environments" and "Environmental Energy." Although these units are among the higher-level modules, the concepts, process skills, and basic equipment are easily recognizable to environmental educators and should prove useful in several different learning environments.

Along with the other seven, the kits are organized around a general theme with emphasis on experimentation, hands-on experiences, and controlling variables. There is minimal use of specialized vocabulary and many items of equipment can be substituted with inexpensive materials found locally. Heavy reliance is placed on group work (4-8 students) which enables youngsters to teach each other as well as share a variety of responsibilities for the experiment. There are no "right" answers for the exercises and students are encouraged to repeat activities as often as desired. Learners complete charts and graphs to aid them in drawing conclusions.

The module is contained in a cardboard box which is convenient for storage and organization. Contents include activity folios and equipment which can be purchased separately or in a complete package. Activity folios are the lesson plans written for teachers; each module includes 4-5 activities which can be completed in about 40 minutes or expanded to extend over several days. The overview folio contains brief sections on activity description, science concepts, process skills, application skills, language skills, and related learning (for math and other disciplines). There is a section on "anticipating" which provides guidelines for special planning and one titled "follow-up" which helps to monitor student progress. Individual folios for each activity provide more detail on specific purposes and readiness skills along with sample teacher questions/student responses and step-by-step advice for completing the activity.

A brief description of the environmental lessons in two modules is beneficial for the educator new to the program. The concept of "environments" is introduced in the **Environments Module** and students learn which environmental factors make life suitable for various animals and plants. Students learn that different organisms require different environments, and that maximum growth is fostered by appropriate environments (SAVI/ SELPH 1981). These goals are accomplished through four activities: Environmental Plantings (various amounts of moisture are used on seeds and bulbs), Sea What Grows (varying concentrations of salt water are used on plants), Isopods (environmental preferences of the invertebrates are investigated), and The Wanted Weed (students go on a scavenger hunt to find a weed meeting certain criteria).

In the **Environmental Energy Module** students explore several concepts associated with solar and wind energy. Students learn how these energy sources can be captured and how the amounts of energy can be quantified. Activities include: Solar Water Heater (trays with reflective and non-reflective surfaces are compared for temperature differences in sunlight), Sun Power (trays of various sizes and with/without lids are measured for heat gain outdoors in sunlight), Blowin' in the Wind (wind energy is investigated by making pinwheels and finding the most effective orientation to a fan), and Wind Power (the amount of energy generated is quantified by measuring how many paper clips the pinwheel can lift).

The benefits from a teacher inservice workshop* focusing on this program were extensive. Pairs of regular and special education teachers became more skilled in science instruction with greatly increased involvement of the special education students. The de-emphasis on vocabulary and "right" answers enables instructors to spend more time on science processes. The equipment is simple and accessible. Students are active participants in this non-threatening learning environment and their creativity is encouraged. Very productive peer-tutoring resulted in several settings with students gaining respect for learners of other ages and abilities. Over one-third of the 30 teacher participants sought and received extra funding to purchase additional equipment from the SAVI/SELPH program. Such commitment from professionals is essential to make change in the classroom.

Challenges for those in environmental education remain and continue to grow. Although the number of children identified to receive special education through federal programs has increased from 3.7 million in 1976 to 4.4 million in 1986 (O'Neil 1988) a large expansion has been seen in the single category of "learning disabled." In many cases, these students are just slow learners due to language barriers, behavioral problems, absences, and above-average competition. To encourage participation by all people into the mainstream of environmental awareness should be the goal of every environmental educator. The SAVI/SELPH program and its philosophy is an effective tool toward that end.

For more information contact the author (Indiana University-Kokomo, P.O. Box 9003, 2300 South Washington, Kokomo, IN 46904-9003), or SAVI/SELPH, Center for Multisensory Learning, Lawrence Hall of Science, University of California, Berkeley, CA 94720, (415) 642-8941.

* The initial workshop "Special Science for Teachers of Special Students" was funded through the Title II, Demonstration and Exemplary Programs, Indiana Department of Education, 1988-89.

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Alive and Breathing in the Classroom

Steven M. Karlin
Pacifica, California

Abstract

A basic blueprint to help make your educational programs using non-releasable wildlife, strong, motivating, and educationally sound. Learn latest techniques of wildlife education, group dynamics, and communications skills that will empower the public to make change.

Learning Under the Sun

Bill Klein
Sioux City, Iowa

Abstract

This program presents many fascinating outdoor labs which take participants beyond traditional science experiments and focus on building observational skills while reinforcing the scientific method.

Incorporating History and the Role of Management into Environmental/Conservation Education Curriculum

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Abstract

Many environmental conflicts result from a lack of understanding of natural resource history and the role of management. History and the role of management should be an essential part of curriculum focusing on natural resources.

Partnership in Environmental Education

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The Denver School for Gifted and Creative Students
Denver, Colorado

Abstract

This classroom-based instructional program focuses on water issues facing Colorado. It uses community resources to empower sixth graders through a unique problem solving format. Students present solutions to specific water problems to a professional hearing panel.

Integration of Environmental Awareness Across the Curriculum

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Abstract

People from different academic disciplines and professions have different interests, perceptions, knowledge, ways of learning, and ways of communicating. Too often these are viewed as barriers to interaction and mutual learning about the environment. To partially overcome these barriers, the college of Arts and Sciences at the University of New England is revising its curriculum so that we can learn not just technical information from each other, but also how others perceive environmental issues and how they grapple with issues and reach understanding.

Our paper describes the theoretical basis and practical results of a three-year effort to integrate environmental awareness across the curriculum. Our approach is interdisciplinary and focuses on content from traditional disciplines as well as applied problem-solving skills. Topics include: 1) history and sociology of the environmental sciences and technology, 2) public policy analyses of research and technological innovation decisions having environmental impacts, 3) ethical analyses of the implicit and explicit values underlying research programs and public policy decisions, 4) political and economic analyses of environmental problems, 5) the global and multicultural dimensions of environmental issues, and 6) interpretations of the relationships of the environment to literature and the arts. We also describe integration of these topics with the skills/methods of values, communication, critical thinking, leadership, research, and experiential learning.

Environmental Physics: An Adapted Curriculum and Teaching Strategy for Non-physicists at a University Level

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Abstract

For the last five years, a pluridisciplinary team has toiled with the tasks of developing a curriculum and teaching strategy for a course in physics pertinent to the needs of "environmentalists." This course had to be designed for a heterogeneous university student population. We will present the ways and means developed, compare and document the rate of success obtained for different phases of the project.

Park Pals: Educating About the Environment Through Community Partnerships

Dr. Martha McAffe and Lisann Peters
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Abstract

The Arlington Independent School District entered into a collaborative effort with the Arlington Parks and Recreation Department and the Junior League of Arlington to develop the Park Pals Project. The program involves first grade students in order to increase their educational and environmental awareness of wildflowers, bulbs, trees, and birds. Teachers, administrators, Junior League docents, and parks' personnel work closely to meet project goals and objectives. Participants in this session will learn how to plan, implement, and evaluate their own environmental education program for young learners.

Adaptations for Survival: An Outreach Package Using Videotape

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Abstract

An outreach package was designed for Life Science students and their teachers using a videotaped lesson and museum specimens. Adaptation was the topic. Two classes were observed completing the program, using qualitative methods.

Many museums provide extension, or outreach, programs as an alternative to field trips. In fact, Zucker found in a 1983 survey that 69% of nearly 400 museums affiliated with the American Association of Museums maintain programs in which the museum "comes to the school." Recent data suggest, however, that only 5% of museums questioned in another survey offered any outreach programs to secondary students (Bierbaum, 1988). This is unfortunate, for many students at this age, particularly those in junior high school, could benefit from the concrete examples available from a natural science museum when discussing abstract biological principles in class.

Videotaped programs are not a new educational idea to museums, but only 10% of the nearly 400 museums surveyed by Zucker (1983) provide videotapes in their educational outreach programs. Even fewer supply appropriate videotaped programs for junior high school students.

There are a number of advantages to using videotaped lessons over other media in an outreach package. Videotapes are lightweight and compact, there are no multiple parts to misplace or reorder, and most students and teachers are familiar with videotape machines (Reider, 1987). The teacher has more control over the operation of a videotape and flexibility over how and when the tape is used. The tape can be stopped for discussions or to answer questions as they occur without losing track of the audio portion or turning the lights on and off.

The videotape format also works well with the museum displays. Whole habitats can be shown to give the students a holistic sense of the interactions happening within an environment. Tight camera shots can then be used to point out specific interactions or to focus on certain exhibits or objects.

Methods

The topic selected for the videotape, "Adaptations for Survival," relates to the Life Science Curriculum Guide for Louisiana. The script began with a general introduction to the concept of adaptation, then applied some of the principles to the animals and plants found in three very different dioramas at the Louisiana State University Museum of Natural Science: the Tropical Rainforest, the Southwestern Desert, and the Arctic-Alpine Zone of the Colorado Rockies.

The teacher was encouraged to stop the machine after each of four questions included on the tape and to conduct a short discussion with the class. The videotape was restarted to reveal the most correct answer. After viewing the tape, students were divided into small groups to look more closely at the teaching specimens included with the videotape as part of a hands-on lesson. Student worksheets and a teacher's instructional packet were included in the program. The whole package was designed to allow practice of process skills, particularly observing, classifying, and inferring of characteristics between and among species.

I evaluated of the lesson using two seventh-grade Life Science classes. Participant observation, informal interviewing, and repeated written surveys were used as a type of observational case study (Bogdan and Biklen, 1982). The first class contained 21 "regular" students taught by a veteran teacher of nearly 20 years. The second class contained 12 gifted and talented students taught by a teacher completing a teacher certification program. I purposely chose these two classes to see if the lesson had enough latitude to accommodate the learning and teaching styles of such different students and teachers.

The evaluation process included four steps. First, I administered a survey of 12 questions to each class before the teacher was suppose to discuss the concept of adaptation to test the students prior knowledge of the concept. For the second step, I gave the same 12 questions as a second survey a few days before the students participated in my lesson yet after each teacher had completed all her planned instruction. The third step of the evaluation involved observing the teacher and students completing the lesson, from the videotape through the hands-on lesson with the specimens. I collected the students' worksheets [illegible] give me a concrete example of how well they understood both phases of the lesson.

A third survey, the fourth and final step, was given the day after the students completed the packaged lesson. This survey contained the same 12 questions as the previous surveys, plus five opinion questions. The teachers were given a different written questionnaire to gather their opinions.

Results

The student responses from both classes did not change much, if at all, from the first to the second survey. Nineteen out of the 20 students in the first class and 6 of the 12 students in the second class were not familiar with the concept of adaptation, despite instruction by their teachers. By the third survey, 17 of the 18 students participating in the first class were still unaware that this concept was covered although only one student could not explain why adaptations were important to survival. Previously, 11 students in this class could not answer why adaptations were important. All of the students in the second class recognized the concept by the third survey and could explain the importance of adaptation to survival.

The student opinions of the program were favorable for the most part. While 22 of the 30 students wrote that they enjoyed the videotaped program, the format of the videotape caused some difficulty; two students did not like stopping for discussions and two other students thought the lack of action made the tape boring. Twenty-eight of the 30 students liked the hands-on lesson. The teachers also gave positive comments, particularly about the hands-on lesson.

Discussion

While the results of this study were not always positive, the overall response to the program was encouraging. Both students and teachers appeared to benefit from the videotape and hands-on lesson. Some changes will be necessary, however.

The components of the program need modifying. More action should be built into the videotape, but, unfortunately, the dioramas do not move. Simulated motion could be incorporated by focusing on an animal as it was being discussed then moving to different angles to show relationships with other animals in the habitat. A longer introduction in the beginning of the tape would allow the students to quiet down and the teacher to adjust the sound and color on the television. Incorporating music in the beginning could catch the students' attention and encourage them to stop talking. The narrator should talk more slowly, particularly as new vocabulary is shown at the bottom of the screen. Changes in the format of the hands-on lesson and the layout of the worksheets are also needed.

More instructions to the teacher in how best to present the program should be included. For example, I wanted to give the two participating teachers creative latitude within the design of the program by providing minimum instructions for conducting discussion sessions during the videotape and hands-on lesson. After observing how they reacted to this freedom, I feel detailed instructions are necessary throughout the program. Regardless of the structure in the teacher packet, flexibility could still be an element in the directions to the teachers, however. With enough supporting information for both the teacher and the student, I believe that students could benefit equally from a number of different approaches when completing this lesson.

Finally, as an introduction to the lesson, the teacher should talk about evolution and adaptation before presenting the videotape to see if the students have misconceptions about what evolution means to the individual animal as well as the population or species. Fisher (1986) listed a number of strategies teachers could take to help students learn from and reshape their misconceptions. Among these strategies are asking and encouraging students to ask "How do you know?", creating a secure environment where all comments are valued, and taking "time to probe the thinking that lies behind the ideas."

Summary

Results from this observational case study suggest that an educational program using videotape has real potential as an outreach format. Interest in the videotape and the hands-on lesson was high among both the teachers and the students questioned. A number of modifications need to be made if this program is to be successful, however.

It is important to note that a videotape of the museum dioramas, or any outreach program for that matter, cannot take the place of an actual field trip experience. It is hoped, nonetheless, that viewing the videotape and examining the museum specimens will increase the students' curiosity about the natural world as well as provide concrete examples of biological principles taught in class.

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A Model for Adapting Traditional Environmental Education Activities for Students With Disabilities

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Abstract

Research suggests that implementing environmental education activities with students with disabilities leads to enhanced academic and social skills. Many environmental educators, however, feel unprepared to conduct activities from some widely accepted EE materials (e.g. PLT, Project WILD, OBIS) and few materials specifically developed for this population exist. This presentation will provide a field tested model for adapting traditional activities for students with disabilities. Participants will participate in activities adapted from Project WILD and have an opportunity to apply the model to an additional activity. Hand-out packets which contain 12 adapted, field-tested activities will be distributed.

Creative Exploration of Nature with Young Children

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Abstract

Through the use of songs, stories, and hands-on experiences, participants will be exposed to a variety of activities that can help young people "bond with nature." Packets will be distributed and people will be involved!

"If children are to keep alive their inborn sense of wonder, they need the companionship of at least one adult who can share it, rediscovering with them the joy, excitement, and mystery of the world we live in.

"I sincerely believe that for the child, and for the adult seeking to guide the child, it is not half so important to **know** as to **feel**. If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seed must grow."[1]

How Do We Begin?

Guiding Principles

-- Start where the learner is, not where you are! **Experience with the** children...they are teachers too!

-- Be what you want the children to be! ... participate, role model.

-- Try not to **inflict** your fears onto the children! Respect their fears, don't give them yours.

-- When in doubt, be positive...when you know for sure, be positive!

-- Respect children's differences, and their uniqueness...respect other animals' uniqueness too!

-- Be honest and don't be afraid to say "I don't know, let's find out."

-- Children learn what they live.

-- You are a child of the universe; no less than the trees and the stars, you have a right to be here.

-- It doesn't really matter whether you think you can or you can't...you are right!

-- Go everywhere, do everything, go go go, do do do!

Sensory Awareness:

A) **Sight:**
  1) Tunnel with slide show...from darkness comes the dawn.
  2) Reading pictures...pictures tell a story.
  3) Kim's game...remember what's under the blanket.
  4) Images/observation circle...whatever you see is what you see.

B) **Hearing:**
  1) Secret box, shake it.
  2) Taped sounds, recording from nature and built environment.
  3) Sounds off, animal sounds imitation.
  4) Sounds count...close your eyes and count the sounds you hear.

C) **Touch:**
  1) Touch socks
  2) Prickly/tickly, on your cheek or forehead.
  3) Scavenger hunts, tactile items.
  4) Find your tree, with blindfolds

D) **Smell:**
  1) Jars with extract, smell jars.
  2) Grass, soil, leaves, anything you find.
  3) Foods, before you eat smell it.
  4) Good and "bad" smells.

E) **Taste:**
  1) Fruit/vegetables...buds, broccoli, leaves, lettuce.
  2) Wild foods, pros and cons.
  3) Toothpaste flavors.
  4) Plug your nose and smell.

Science: observing...collecting...ordering

"I hear...I forget...

I see...I remember...

I do...I understand"

Focus on Animals

A) Puppets and stuffed toys:
Country Critters, 217 Neosho, Burlington, KS 66839,

(316) 364-8623, puppets
Folkmannis, 1219 Park Avenue, Emeryville, CA 94608,
(415) 658-7677, puppets
Firerobin, Box 247, Richmond, VT 05477,
(802) 434-2511, finger puppets

B) Animal tracks, rubber feet for stamping purposes:
NASCO, 901 Janesville Avenue, Fort Atkinson, WI 53538,
(800) 558-9595, (414) 563-2446, flexible animal tracks

C) Live animals.

D) Camouflage...hide and seek, role-play mice and hawks...use pieces of fur and toilet paper tubes.

E) Coloring pictures after seeing the animal.

F) Puzzles...large pictures cut up.

G) Role-playing, i.e., robin hunt, turtle shells with boxes.

H) Pets/domestic animals with straws and puffed wheat.

Focus on Plants

A) Grow seeds, sprouts, lima beans in plastic cups with toweling.

B) Gardens.

C) Leaf rubbings/bark rubbings, with skinned crayons or ink pads.

D) Nuts and fruits...it takes a flower to make a fruit.

E) Seed dispersal search, hitchhikers and parachutes and helicopters.

F) Natural colors, painting on white paper.
   1) Dandelions...yellow.
   2) Grass...green.
   3) Soil...brown/black, etc.

Focus on Songs and Stories

A) Songs (write to David W. Stokes, 1111 E. Brown Deer Road, Milwaukee, WI 53217 for a list of songs and tapes for "Accurate and Positive" nature songs for young children.
   1) Frog chorus...real and imagined...D. Stokes' version.
   2) Frogee...cottontail...woodchuck...whitetail...D. Stokes.

3) Gray squirrel...red squirrel...chipmunk...Trad. and D. Stokes.
4) If all the raindrops...
5) Nature lover...bats, toads, and spiders...D. Stokes.
6) Rain cheer.
7) Salamander.
8) Skunk's song.
9) Sun is coming up...Earl Horn...Rain is coming down...D. Stokes.
10) Timber wolves and snakes...D. Stokes

B) Stories and storybooks.

Story/Book	Where To Do It	Miscellaneous
All Around Us Eric Carle Picture Book Studio	Open, comfortable spot near pond, meadow or edge of forest	
Bird in the Hand	Anywhere	Downy feather
Child & the Busy Parent	Anywhere	Picture of the earth/ little child
Everybody Needs A Rock Byrd Baylor Charles Scribner's Sons	Near rocks, beach, parking lot, railroad bed	Have enough rocks to give everyone
Frederick Leo Lionni Knopf/Pantheon	Near a stone wall, hollow log or place a mouse might hide	Mouse puppet
The Giving Tree Shel Silverstein Harper & Row	In woods or near a tree stump	Tree cookie, cross section
The Honeybee & The Robber Eric Carle (numerous titles) Philomel Books	Near a beehive or meadow with active honeybees	Bee puppet
I Am a Mouse Ole Rison Golden Press, Western Publ.	Near edge of the forest, comfortable spot	Mouse puppet, owl puppet

Kartusch Stephen Cosgrove Price/Stern/Sloan	Near a pond or forest opening	Puppets (K + FE)
The Mountains That Loved a Bird Alice McLerran Picture Book Studio	Near a rock outcropping or "bare" hilltop	Bird puppet and a seed
Mousekin's Golden House (numerous titles) Edna Miller Prentice-Hall, Inc.	Near a pumpkin patch or meadow with seeds	Pumpkin, mouse puppet, seeds to share
Night Walk Story	Near thicket or woods	Candle lantern or flashlight
Peterkin Meets a Star Emilie Boon Random House, Inc.	Meadow near a tree with open view of sky	Glow star
The Very Busy Spider Eric Carle Philomel Books	Meadow with tall "weeds"	Spider puppet
This is a Plant Mary T. Watts	Anywhere	Puppets or pictures

A Four Season Brainstorm

A) Fall.

1) **Natural happenings**...Bird migration, seed dispersal (it takes a flower to make a fruit; a fruit is the covering for a seed), preparing for winter, etc.

2) **Program ideas.**

a) Study birds and their adaptations, how are they different from other animals. Collect human tools that represent bird adaptation, i.e., a strainer for a duck's bill, a hammer for a woodpecker's bill, etc.

b) Collect seeds, like nuts that people eat and find natural seeds outside like acorns, walnuts, sunflower seeds, and burdock. Then go for a walk in a tall grass field with fuzzy knee socks on, or long pants that are fuzzy (corduroy is good). The socks will "collect" seeds and you can sort the different kinds and talk about foxes who might "collect" seeds too. In **Hug A Tree** on page 60 "Grow a Sock" is a great activity. Use Audubon aid on common seed travelers, available at Schlitz Audubon Center.

c) Read Frederick, by Leo Linonni, as preparation for winter. Read Mousekin's Woodland Sleepers, by Edna Miller, and Mousekin's Golden House, by Edna Miller.

d) Fly kites and make bat kites, see stencil and study clouds and air in motion. Do a color search puzzle.

B) Winter.

1) **Natural happenings**...animal tracks can tell who is living around you and where. Cold weather and low sun shadows, snowflakes and frozen water.

2) **Program ideas.**

a) Make footprints in the snow and try to compare your footprints to those made by other animals like cats, dogs, squirrels, birds by a feeder.

b) Feed the birds and try different types of feeders and feed. See handouts. Imitate birds and make up stories about them. Try a human birdfeeder.

c) Read The Snowy Day, by Ezra J. Keats, Peterkin Meets a Star, by Emilie Boon, Mousekin's Woodland Sleepers, by Edna Miller, Two Coyotes, by Carol Carrick. Get animal pictures to enhance the stories or puppets/stuffed toys. Try actual animal parts and furs from loan museums or nature centers, or hunter friends.

C) Spring.

1) **Natural happenings**...babies are born and sounds are real easy to hear. Buds are popping and young leaves are sprouting. Rains come.

2) **Program ideas.**

a) Do the **Rain Cheer**, and tape record it. Try to think of the positive side of rain. Do raindrop painting. Catch rain on wax paper and make rivers.

b) Plant seeds, soak lima beans and plant them in a see-through plastic cup. Watch as they grow.

c) Clip twigs (about one foot) from trees and place them in a vase of water and they will produce leaves weeks earlier if put in a sunny, warm window.

d) Read Chicken's Aren't the Only Ones, by Ruth Heller, Mousekin's Birth or Family, by Edna Miller, and Kartusch, by Stephen Cosgrove.

e) Make sunprints, or leaf rubbings/ink prints.

D) **Summer.**

1) **Natural happenings**...flowers bloom, shade is at its best, butterflies are out and insects and busy pollinating flowers. Large animal activity is seen most at night or at dusk and dawn. Animals and plants are growing.

2) **Program ideas.**

a) Color search is very easy at this time and a puzzle can be made. Camouflage games can be played.

b) Honeybees are doing their thing; visit an observation hive at a nature center or Honey Acres. Eat honey, fly like bees, do a bee dance and sing a bee song.

c) Read Honeybee and the Robber, by Eric Carle, I Am a Mouse, by Ole Rison, Mousekin's Close Call, by Edna Miller, The Very Hungry Caterpillar, All Around Us, The Very Busy Spider, and The Grouchy Ladybug, by Eric Carle. Use puppets/stuffed toys to enhance the stories and find live animals that can help bring the story to life.

d) Role play animals, fly like butterflies, birds, bats, walk like pond insects, etc.

Resource Bibliography - An Incomplete List
For the adult/leader:

1) Hug A Tree, by Rockwell, Sherwood & Williams.

2) Mudpies and Magnets, published by Gryphon House, Inc.

3) Living Lightly in the City, by Maura O'Connor and Schlitz Audubon Center, published by Schlitz Audubon Center.

4) Reaching for Connections, by David W. Stokes, published by Schlitz Audubon Center.

5) Ranger Rick & Your Big Backyard Magazines, National Wildlife Federation, (202) 797-6800, Washington, DC 20036.

6) Sense of Wonder, by Rachel Carson, published by Harper & Row.

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[1] Paraphrased from The Sense of Wonder by Rachel Carson, Harper and Row, Publ., New York.

Living Lightly in the City and on the Planet

David W. Stokes, Assistant Director of Education
Schlitz Audubon Center
Milwaukee, Wisconsin

Abstract

Through the use of AV materials, hands-on experiences and discussion, participants will become familiar with the Living Lightly curriculum guides and how to make use of them in their teaching.

City life creates illusions — that our food comes from the stores and market, water from the faucet, electricity from the wall, and that the air we breathe is "just there." We congregate in cities, but we "live" off the land. The challenge of reaching urban audiences with the message that we congregate in cities, but we "live" off the land still exists and probably will remain a challenge well into the 1990s and beyond. To meet these challenges, the National Audubon Society has developed a four-volume, 600-page curriculum designed to be used by educators in an urban or rural environment to bridge the gap between the world of nature and the city. This curriculum is called Living Lightly in the City, K-6, and Living Lightly on the Planet, 7-12. David Stokes of the National Audubon Society, Assistant Director of Education at Schlitz Audubon Center, will conduct an introductory workshop on the Living Lightly series.

Land Ethic and Its Relevance to Urban Audiences

"...And man created the city, a world...of abundance from which mankind can provide for himself all that is needed."[1]

Three-fourths of Americans live in cities. For many of us, this is the only life we know. This is where we work and play. This is our home. Because we are generally isolated from direct interaction with land, our city life sometimes created illusions about our dependence on natural resources. The natural world seems irrelevant and not part of our daily lives. The question isn't if we should, but how do we as educators restore the reverence for the land in a population that is physically and emotionally isolated from a land ethic?

One Solution for Meeting the Challenge

Over a decade ago, Schlitz Audubon Center began an outreach program directed at urban children. From that program, a curriculum was developed called Living Lightly in the City by Maura O'Connor and Kathy McGlauflin. Through the schools, Living Lightly in the City educates, informs, and develops an awareness of the natural world.

The curriculum stresses repeatedly the choices and alternatives to everyday living that we have and that are directly related to nature — a decision-making process that promotes awareness of our impact on the Earth. How many of us, for example, walk or ride a bus or a bike instead of using our automobile? We all have the freedom to speak out and to act, to implement ecologically sound decisions.

Maura and Kathy developed a program for the urban setting, working with teachers, using available resources and materials. Living Lightly is specifically designed to be implemented with existing curricula. This was a necessity, especially in light of the "back to basics" movement. The program is flexible and can be integrated into the teaching of basic skills.

Complete, the curriculum offers four guides, K-3, 4-6, 7-9, and 10-12. The guides are written for all the children, but they are targeted at the urban child.

In developing this program, we needed a familiar reference point — a school yard or a playground. It provides a marvelous opportunity to teach and learn. Living Lightly makes the connection between natural history and the child's own surroundings and lifestyle.

Appreciating One's Neighborhood as a Starting Point

In the K-3 curriculum, children are invited to explore their own environment — there's an emphasis on discovery, enjoyment, and wonder. Activities are designed to acquaint children with the living things in their community, to get them to gain some understanding of how they fit into the overall environment...in some instances, using language arts to express themselves and to learn.

One activity, called the "Magnificent Walk," allows children to examine in detail parts of their own surrounding. Another activity is entitled "Patterns in Nature." By comparing and contrasting details of natural and built design, children are helped to discover the beauty of their own environment. They look carefully at trees in one unit called "Trees Help Me" and are encouraged to care for trees. In Milwaukee, vandalism causes severe problems. One out of every two trees planted in this city must be replaced because of vandalism.

In one activity, each child finds something around the school beginning with almost every letter of the alphabet. They then draw pictures on these letters and display them on a web showing interdependence. They can also map their own neighborhood. It helps them in discovering environmental concepts, diversity, interdependence, and change. It helps develop a sense of community, all found within the child's immediate neighborhood.

Some children may choose a collage to express their view of city life. As children map their neighborhood, they begin to look at it differently, starting to decode the elements of their surroundings. The environment can be overwhelming, but by explaining small pieces of it, it can be put into an understandable framework. One unit called "C Is for Caring" directs the children to look for signs of care and neglect in their own community. In the Living Lightly curriculum, students are allowed to create "Litter Monsters." It opens the way for discussion of "throw-away" mentalities and the consequences of it.

Examples of How the Natural World Can Be Made Relevant to Urban Students

In talking to the children, K-12, it became obvious that most of them had no perception of their own connection with the community and the natural world. When fourth, fifth, and sixth graders were asked if a city could be built without any resources from nature, 75% of them answered "yes." Many of the activities in the 5-6 curriculum guidebook are aimed at helping children bridge this gap. For example, a rock cycle transparency is used to teach children about the natural forces affecting the formation of metamorphic, igneous, and sedimentary rocks. The students go on to examine their immediate surroundings to find examples of rocks in the urban setting. They can see, for example, the sidewalk they walk on everyday comes from sedimentary rock. It helps make the connection between resources and nature and the constructed environment that we have built for ourselves.

A water cycle transparency is used in a water unit study, helping children understand part of the natural system. Simply turning on a faucet can demonstrate how we interrupt the natural cycle of things to provide for our own needs, that the water spewing from a spigot is the end product of a complicated process, and what goes down the drain starts another part of the cycle.

A unit entitled "Going Places" teaches students about transportation and fossil fuels. To point out the influence of the automobile, children write and essay entitled, "The Day the Cars Disappeared." In a unit called "Enough for Everyone," students use draft detectors to find energy leaks in their school. The unit relates energy concerns to the students' everyday life — important since 75% of the students questioned in pre-testing said they were not willing to wear more clothing in winter and not willing to turn down the thermostat. For the 4-6 graders, one activity called "The Air We Breathe" illustrates the complexity of problems created by air pollution.

Issues and Possible Solutions Are Stressed at Upper Grade Levels

For grades 7-9 and 10-12, Living Lightly on the Planet focuses on finding solutions to environmental problems. Students begin to understand environmental issues, their complexity, the consequences, and impact. Part of the grade 7-9 guidebook finds students investigating the carrying capacity of systems, urban as well as natural. This and other sections lead to the premise that our bulging population is straining the Earth's resources. Land use planning activities include role-playing and investigating patterns of land use in the students' own community. The unit on water introduces students to groundwater, aquifiers, and a steady infiltration of hazardous waste into the water supply system.

One Living Lightly experiment demonstrates how the leaching of landfills and carelessly discarded hazardous waste contaminate our valuable and irreplaceable groundwater deep within the Earth. Another unit examines our lifestyle and consumerism and the effect on the environment. Using plastic, for example, students make a sculpture of disposable items. They can also analyze advertisements, finding ways to determine the environmental impact of various consumer goods, raising questions about the consumer.

The unit entitled "This Land Was Made for You and Me" explains while we claim to own land, we're really only borrowing against the future. It is essential for our children to learn to intelligently care for this priceless resource. Living Lightly exposes children to the positive aspects of their environment, to its delicate balance, to its need for care and protection. It shows children the relationship between their own neighborhood and the natural world. Living Lightly gives children the knowledge and skills necessary to make wise, informed decision, in an attempt to "live more lightly" on this planet, to be aware of our own consequence, to enjoy a clean, healthy environment.

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[1] Paraphrased from "Wild America," a film produced by the National Audubon Society, New York.

Energy IDEAS for Your School

Janey Swartz and Duane Toomsen
Iowa Department of Education
Des Moines, Iowa

Abstract

The award winning Iowa Developed Energy Activity Sampler (IDEAS) is filled with activities for students to learn energy concepts through a learning cycle strategy. Activities are specifically designed for K-2 and 3-5 elementary, as well as for 6-12 teachers of science, mathematics, social studies, language and creative arts, home economics, and vocational technical arts.

Using Children's Literature to Enhance Nature Awareness

Janey Swartz and Duane Toomsen
Iowa Department of Education
Des Moines, Iowa

Abstract

Books about animals, Native Americans, astronomy, geology, and other topics have been assembled into a bibliography for elementary teachers use. The session is designed to demonstrate the use of a story to communicate a concept through the learning cycle.

Environmental Systems

Audrey R. Swindal, Environmental Specialist
Polk Environmental Education Resource Center
Bartow, Florida

Abstract

Environmental Systems is a six-week interdisciplinary curriculum designed to teach ecological principles to middle school students. It is culminated with an en-loco field experience at the PEER Center. Teaching

strategies will be demonstrated, and student text/workbooks will be distributed to participants.

Environmental Action in Elementary Schools

Terry G. Switzer and Nancy M. Landes
BSCS
Colorado Springs, Colorado

Abstract

Learn how elementary students can take action on environmental problems through a new science curriculum supported by the National Science Foundation. In this innovative program, students study such issues as endangered animals, limited resources, waste disposal, and population growth at each grade level K-6.

More Than Just a Field Trip

Randolph R. Tully, Jr.
EEIDS, Lee County Schools
Fort Myers, Florida

Abstract

Explore a comprehensive Community Studies Program, serving 20,000 students with systematic, K-12 field trips. The 4MAT learning styles brain dominance model, trip delivery alternatives, basic studies ties, and local/state curriculum connections are explained.

Teaching Environmental Issues - Two Approaches

Trudi L. Volk and Harold R. Hungerford
Department of Curriculum and Instruction, Southern Illinois University
Carbondale, Illinois

Abstract

This session will focus on a well-researched model for getting students involved in environmental issues. Two approaches for utilizing the model will be presented and discussed. Recently developed curriculum materials for each approach will also be presented.

Infusing Environmental Issues Into the School Curriculum

Dr. Dennis Yockers and Dr. Daniel Sivek
Wisconsin Department of Natural Resources
Madison, Wisconsin

Abstract

This session will focus on the process of infusing environmental issues into the school curriculum. Participants will get involved with activities from natural resource study guides focusing on groundwater, solid waste, and acid rain.

Strand 6

Communication Mechanisms: Networks, Consortiums, Newletters

The Non-formal Education Plan As a Working Tool

Edith Felchle
City of Fort Collins, Natural Resources Division
Fort Collins, Colorado

Abstract

A formal plan for non-formal natural resources education addresses goals, audiences, and tools of such education. Background of the plan's development and use provides a basis upon which to develop such a plan.

Why Formalize the Non-formal Education Plan?

If you need to maximize efficient use of available education tools, save time, legitimatize or justify your education program, or assist staff members, then you need a formal education plan or guide.

A formal plan maximizes efficient use of available education tools by putting those tools at the project manager's fingertips. Without guidelines, the project manager must ask the same questions for every project:

— What are the possibilities for getting this information to the public?

— How was education accomplished on previous projects?

— How have others communicated with their audiences?

— Which education tools are appropriate for a specific audience?

By essentially reinventing the education wheel on each project, the project manager consumes precious time and risks overlooking important audiences and valuable education tools. An education guide provides answers to the above questions. It saves time and increases the probability of success by helping the project manager identify appropriate audiences and by providing a selection of education and communication tools.

The guide is invaluable for the natural resources specialist with little background in education or communication. It provides essential information about the whole business of communication and education. It gives the natural resources specialists on your staff basic tools needed to become effective in the art of communication.

Finally, the education guide helps to legitimatize and justify your education program. Funding and empowering agencies require legitimacy and justification. They will be particularly interested in the definition, principles, and goals in your plan.

These are basic reasons for developing a formal plan or guide. Your agency may have some unique reasons. It is important to identify your reasons for developing the guide. It will help you determine the format, scope, and direction of your document.

Developing the Education Guide

Research — After identifying the reasons for developing the guide, you will want to review similar documents. Non-formal environmental education is still new, and few formal guides exist. But with a bit of research, you will find some; e.g., Florida's Comprehensive Plan for Environmental Education, and Natural Resources Education Guide for Fort Collins, Colorado. Because few such documents exist, you will probably not find one that exactly parallels your needs. But they will help steer you in the right direction, and you will discover elements others have considered important in such a plan.

Goals — Goals are usually written early to set the tone and direction of the document. You may, however, have only a rough idea of the goals of your overall education program at the outset of document preparation. If so, and if no clear-cut goals exist for your organization's educational responsibilities, the exercise of developing the nuts and bolts of the document may help you recognize patterns that will define and clarify your educational goals.

Your research will be helpful in preparing this section. Other organizations' goals may help you identify or refine goals for your program. If you are borrowing goals from other documents, it is important to personalize the goals to your organization or locality.

One thing you will need to address when developing goals is the environmental ethic espoused by your organization. That will determine whether your goals, and thus your education program, reflect anthropocentric, dominant species, or holistic values, or some other value system. Remember, funding agencies will look closely at the goals section. Be precise and inclusive in stating your goals.

Components — Next you need to identify the components of your guide. These may vary for different agencies. We chose five: definitions and principles, goals, general guidelines, audiences, and tools. Other components might include history, politics, and philosophies. Keep in mind that the more components the guide contains, the larger the document will be. A large document may seem intimidating and may discourage its use. If the guide is to be a working tool, keep it simple and small enough to be easily used.

Subcategories — Some of your components will need subcategories. An important subcategory for any plan will be audiences. List each audience that falls into either of two categories:

— Those who need to learn material presented by your agency or organization. This may include children, adults, politicians, business owners and operators, parent groups, school leaders, and co-workers.

— Those who are capable of providing or withholding funding or other resources that impact your projects. This may include environmental groups, political entities, foundations, taxpayers, and supervisory level personnel.

Communication is a two-way street. Think of audiences not only in terms of people you need to inform, but also in terms of people who, if informed about your programs, can provide resources (funding, volunteers, materials, consultants) to help you succeed. Your audience list will be specific to your organization. For example, if your organization has no involvement in politics, you would not include city or county politicians. You might, however, include city or county staffs because they might be an educational resources from which you can draw.

Tools — You are now ready to develop the education tools section of your plan. This section is vital because it will greatly expand the number and types of methods your organization uses to educate its public. A major goal of this section is to avoid probably the biggest mistake made in non-formal public education, i.e., the automatic decision to "create a brochure" and consider the education task complete. Brochures are appropriate in some, but not all, situations. Yet they seem to be the mainstay of the non-formal education diet. The tools section of your guide will expand the menu of educational methods from which your project managers choose.

As you begin this process, take time to brainstorm — list all of the ways of communicating that you can think of. Then add communication and education tools from your research of other non-formal education guides. You also might ask you staff to help by answering the question, "Assuming there are no limitations, how could we teach natural resources protection to the people we need to reach?" If this question seems too broad to get thought processes going, narrow it to a specific audience. Ask, "How can we teach natural resources protection to children?" Our staff spent about an hour simply listing possible education tools and programs for children. I later reviewed this list and found patterns and categories that led to identification of education tools for all audiences.

Tools/Audiences Match — You now need to match your list of tools to your list of audiences. Each audience section should begin with a brief description of the audience identifying the following:

— Who makes up the audience

— How natural resources education relates to the audience

— Unusual aspects of communication relative to the audience

— Resources the audience may be able to provide for your programs

Following the description of the audience, list the education/communication tools that work well for that audience, and briefly describe how each tool pertains to educating that specific audience. If a tool has particularly high or low effectiveness with an audience, indicate that. As we discussed earlier, brevity is important in this document. Don't include everything that is known about each tool, just the basics.

Definition and Principles — In your definition and principles section, you may choose to quote a widely accepted definition of environmental education such as the definition from the National Environmental Education Act of 1970. Or you may choose to develop your own definition. In researching definitions of environmental education, you will find important statements that may not qualify as definitions but are closely akin such as the decisions formalized by the Tbilisi Declaration. These may be included as principles of environmental education.

General Guidelines — The general guidelines section will contain background and basics of education and communication that project managers need in order to design successful education projects. You will be tempted to include volumes of information here. Resist the temptation, and limit the information to that which is absolutely vital to the success of your organization's programs such as the proper use of language to achieve a particular goal or tips on clarity of communication. Ask yourself two questions:

— What are the biggest mistakes made by our project managers when designing and implementing education projects?

— What are the basics of communication without which most education projects will fail?

The answers to these questions will dictate the information you include in the general guidelines section.

Conclusion

An effective education guide or plan will expand and modify as environmental education matures, as audiences change, and as issues emerge and fluctuate. Developing your guide will take time, but the rewards will include more efficient and successful education projects, a sense of direction which many non-formal education programs lack, and maybe even increased funding.

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Meyers, Gail E. and Michele Tolela Meyers. 1976. The Dynamics of Human Communication: A Laboratory Approach. McGraw-Hill, Inc.

World Conference on Environmental Education. 1977. Tbilisi Declaration.

Newspapers in Education

Rebecca Haynes, Education Coordinator
The Commercial Appeal
Memphis, Tennessee

Abstract

Many newspapers work with the educational community to provide information and training for updating and extending instruction with the newspaper. This session will make members aware of Newspaper in Education (NIE) programs and the resources they offer for environmental education.

Education in Action: A Community Problem Solving Program for Schools - Rouge River Water Quality Monitoring Program

Martha Monroe and Arjen Wals
School of Natural Resources, The University of Michigan
Ann Arbor, Michigan

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Abstract

Slide-paper presentation on the Rouge River Water Quality Monitoring Program involving 40 school systems on the Rouge River (science and social studies classes) and through an interactive computer based program involves 100 other schools in the United States and 25 countries.

Interactive Water Monitoring

Downstream from Champion International's paper mill, the people of Newport, Tennessee blamed the dark, foamy Pigeon Creek for destroying their meager tourist business, preventing new economic ventures from getting started, and defying EPA standards for water quality. The controversy over the permit renewal for Champion drew 11,000 citizens to two public hearings (the largest number recorded in EPA's history) and 160,000 letters. With an 80 year history in Canton, however, the paper mill is the largest employer in western North Carolina. Retrofitting the old mill to meet EPA standards appears that it will cost Canton 1,000 of their 1,800 mill jobs.

Volunteers in Vermont monitor rivers to help identify failing or nonexistent septic systems, and submit their results to the state Water Resources Department. Many of the volunteers are high school students who monitor the rivers through their high school chemistry class.

Elementary students in Washington have stenciled local storm drains with the message, "Dump No Waste, Drains to Stream" to educate the public about the problems of disposing of waste oil, paint thinner, antifreeze, etc. into neighborhood drains. The students are concerned about stream quality and fish habitat. An estimated two million gallons of used oil are dumped into streams that drain to Puget Sound each year.

Across the continent and around the world citizens are becoming more aware of the value of high quality rivers and streams and are working to protect or restore them. In some cases the impetus for the concern is a new license or proposed development. With others, concern grows from the schools.

The University of Michigan's School of Natural Resources began assisting schools with the river monitoring when students in Ann Arbor became concerned about the wind surfing concession operating on a local river. Their tests indicated that the river should not be used for body contact after heavy rain. From their data arose questions of upstream and downstream water quality, and the following year three school systems were involved in monitoring the same river. From this small beginning grew an interactive project that now operates on four midwestern rivers with over 50 schools and is quickly spreading to other watersheds around the world.

The basic elements of the Interactive Water Monitoring Program are:

1) Simple, reliable tests that measure the nine parameters in the National Sanitation Foundation's Water Quality Index are performed in one day to collect meaningful data about the river's quality. Tests are taught to teachers in workshops, and many schools are assisted by trained university resource people.

2) The data are compared and shared along the watershed through a computer conference system and/or a student conference. From this joint analysis and interpretation, students generate questions and concerns about their river. The data may also point to issues regarding local land use patterns.

3) The students build off their concerns by identifying particular problems, collecting additional information, and then planning to take action to improve the state of their river.

The program developed over the last three years around the Rouge River in southeastern Michigan. Starting with 16 schools in different school systems along the watershed, it now brings together 39 different schools from the suburbs to inner Detroit. The following optional elements were developed by or for Rouge teachers and are now part of the Interactive River Monitoring Program:

1) A game simulating increasing waste production, development pressures and decision-making in various communities in a watershed was designed for social studies classes. It assists students in clarifying their values in the face of controversial issues that affect their quality of life.

2) Examples of other river problems and the solutions that are attempted are available through a booklet of environmental endeavors. The use of these mini-case studies should build a broader understanding of the problems of water quality and may inspire students to take action in their area.

3) Samples of land use and citizen surveys are available for teachers. These data may complement their water quality data and color the choice of their action projects. Results of citizen surveys are communicated to the local organization, Friends of the Rouge.

4) Field trips and bus tours along the watershed have been compiled by teachers and the Friends to guide school groups.

5) Guidelines for benthic sampling, diversity studies, and aquarium construction are available to help teachers and students see differences among several sections of the river and understand that organisms can indicate water quality.

6) A curriculum guide that links water monitoring activities to the state science and social studies curriculum objectives or textbooks is being planned for a summer project.

7) Taking advantage of Detroit's location, across the river from Canada, the Rouge students can link into a similar project that occurs on Ontario's Grand River, thus providing an international component. An International Great Lakes student conference has been proposed for next year, involving student monitoring studies in Saginaw, Grand Rapids, and Detroit, Michigan; Cleveland, Ohio; and Waterloo, Ontario.

Benefits of the Program

Although pre and post evaluative data were collected this spring and have not yet been analyzed, teachers, administrators, students and staff are encouraged by this program for a number of different reasons, not all of which are measurable by standard tests. Some students, for example, are excited to simply go outside for a day; many districts no longer fund field trips at the high school level. They are able to devote two weeks of intensive study to a real issue that flows through their community. They are able to communicate with other students—in their watershed and around the world—who are also concerned about the same issues. Finally, students have an opportunity to act on their concerns, develop projects, write letters, and channel their energy toward improving their environment.

Teachers respond positively to the program for the same reasons and others: work on a local, science-based issue brings their curriculum alive and matches state objectives in Science-Technology-Society. Through the university resource people, teachers receive classroom assistance and support. The test kits were distributed at no charge (provided through Ford Foundation funding) and will remain with the schools. The workshops, computer conferencing, and student Congress provide opportunities for teachers to talk to other teachers about curricular issues and ideas.

The media in each community respond positively to the local field day of testing, and are often quick to print the students' results and action plans. The student investigations support any existing activity regarding water quality, and usually spark a great deal of public awareness and concern. In communities embroiled with plant closings, neighborhood homicide, deteriorating race relations, crack cocaine, and other difficult issues, positive energy from young people for the environment is not unlike a welcome breath of fresh air. Building from this favorable image, several teachers have obtained sizeable grants from their school districts to support additional equipment purchases to involve more students—the mere mention of the project wins nearly instantaneous community support.

The pre and post surveys will help measure changes in student knowledge, awareness and problem solving skills, as well as the degree to which they feel empowered to affect change on the local level.

On the International Level

The Interactive River Monitoring Project has been introduced to 19 different countries this summer through workshops led by University of Michigan students and sponsored by local teachers and education departments. Each country can adapt this educational program to meet its needs and abilities, and join the Global Rivers Environmental Education Network: **GREEN**. Through computers, a newsletter, and other forms of communication, students and teachers will be able to share their data, concerns, and plans for protecting and improving water quality with the world.

Potential Concerns

In addition to the typical problems that face many new ventures (e.g., a sudden and unsustainable burst of energy for anything new, high initial costs for equipment, lack of time to consider an action project if teachers choose a May field trip), this particular program has two additional challenges to overcome. The essence of its interaction involves students talking to each other via computers, but most schools are lucky to have but one computer with a modem in the classroom. It is difficult to involve an entire class in the communications aspect of the project when only one student can work the keyboard at a time.

Trained resource people are another important element in this program. If teachers lack confidence to begin teaching the water quality tests, however, it is too easy to become dependent on the resource person. It is less likely that these teachers will continue the program unassisted in the future.

Resources

The following resources could be useful for starting your own river monitoring project:

Field Manual for Water Quality Monitoring: An Environmental Education Program for Schools by Mark Mitchell and William Stapp. Available from William Stapp, 2050 Delaware Ave., Ann Arbor, MI 48103.

Adopting A Stream: A Northwest Handbook by Steve Yates. University of Washington Press, P.O. Box 50096, Seattle, WA, 98145-5096.

GREEN: School of Natural Resources, University of Michigan, Ann Arbor,
MI 48109-1115.

Environmental Action Through Telecommunications

Dr. W. J. "Rocky" Rohwedder, Associate Professor
and Bill Leland, Director, Econet
Environmental Studies and Planning, Sonoma State University
Rohnert Park, California

Abstract

Presentation on the opportunities for environmental networking, problem solving, information dissemination, and action through telecommunications. Will include a summary of the present state of electronic communications as well as a live demonstration of EcoNet - an international telecommunications network designed specifically for the environmental community.

Strand 7

Developing a Support Base for EE Programs: Marketing, Fund Raising, Volunteer Use

A Professional Approach to Public Relations and Marketing

Marc Breslav, Public Relations and Marketing Consultant
South Mountain Pass
Garrison, New York

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Abstract

This paper treats one subset of public relations and marketing as it interfaces with conservation and environmental education—publicity. It stresses the importance of planning and evaluation. It discusses how to develop press contacts and to obtain coverage. It describes the difference between news and feature angles. It deemphasizes form and rules, instead emphasizing the "publicizable moment."

Many public relations discussions emphasize the form and the rules. A press release **must** have one-inch margins. It **must** end with -30- or ###. In fact, some of us who are public relations professionals know the real truth of the matter: the form is the least important thing. It is the story, the idea, the angle, the hook, the slant, the spin, that makes it or breaks it. News value, uniqueness of content and creativity of approach are more important than the width of the margin or even the press release itself. Forget the form and the rules and **use what works**.

Some Definitions

Edward Bernays, often called "the father of public relations," defined public relations as "the engineering of consent."

I define public relations a little differently[1]. Imagine that each of the following disciplines or entities was a circle: education/interpretation, publicity (e.g. press coverage), marketing, advertising, publications (e.g. brochures, books), direct mail (e.g. fliers sent via the mail), fundraising, government relations and so on. Merge these circles in such a way as a portion of each of them intersect and overlap, as in a Venn diagram or the old Reingold beer logo. The area where they merge defines the broad discipline of public relations, or all those activities which in some way influence and impact any or all of an agency's publics.

For the purposes of this discussion, because of the limitations of space, we'll examine publicity, one aspect of public relations which people often erroneously consider to be fully synonymous with public relations.

Importance of Planning and Evaluation

Most public relations activities should begin with a planning process and a written plan. Few do. As with good education, it is crucial that you begin by defining your objectives. Determine what you want to "say" and who you want to "say" it to. That is, what is your message, and who are your publics or audiences?

Another thing public relations activities rarely do is to leave enough time. Start early, at least six months before you want results. Many magazines have three or four month deadlines.

Finally, evaluate results, both as they do or do not happen, and again afterwards. In the realm of publicity, the most tangible results are the stories that find their way into the media, which can be further evaluated on their number, size, quality and slant. For publicity campaigns that relate to anything longer than a one-day event, evaluating all this as it happens allows you to modify your efforts to create better results, or play off what you have successfully achieved. And when the campaign is complete and the dust has settled, an evaluational "debriefing," even if only between you and yourself, gives you invaluable insight for the next one.

Developing Press Contacts

All the planning and evaluation will do you no good if you don't know your way around the media you are targeting. For starters, you must study this media. If your targets center around one particular geographical area (e.g. a metropolitan area), read, watch and listen as much as you can. Who sets the media agenda of the area? That is, which medium is the leader who many or all of the others follow. In many cities, this is the biggest (or only) daily morning paper. For example, in New York City a story that appears in the New York Times on Monday morning, may be on 10 different radio stations by noon, on three different evening news television programs, and in two other dailies the next morning. Naturally, you want to put extra attention and effort into getting to know the medium that sets this agenda, because your efforts go farther.

Keep track of who writes or speaks about what when, especially in the medium that sets the agenda. Get to know who has "beats" which relate to what you are trying to communicate, but be creative in your analysis. A paper might have an environmental reporter, but if you're sponsoring a maple sugaring festival, the food reporter might be your best contact.

Remember your friendly reference librarian and the biggest corner newsstand. The librarian may have various media directories or press lists which can at least give you a starting point. The newsstand might just carry a paper or magazine you otherwise might not have known about.

Once you've mastered the media, try to get to know reporters and editors personally, and treat them as you would a friend. The Golden Rule applies here. Once you've gotten to know a reporter or editor, don't always contact them with your story, call them up with a non-selfish tip or just for lunch. Acknowledge them when they do a good job. Remember, too, that in the media business, as in all business, who knows whom is a crucial operating principle.

Obtaining Coverage

With all the aforementioned in hand, the key to obtaining coverage is the angle or peg of the story you are promoting. There are two broad categories: news and feature or human interest.

When it comes to defining the former, some people rely on the old saw that "news is new." Some examples might be the opening of a new nature center, the first sighting of a bird in the state, or the introduction of a new resource management plan. However, I once asked a very wise old reporter at the New York Times how he defined news. He said "I wish I knew," and then on reflection, said that "news is what the editor thinks is news." This, I think is closer to realty than "news is new," meaning that interpretation and who knows whom definitely applies to the news judgement.

The other kind of angle or peg presents far more frequent opportunities in the world of conservation and environmental education, yet its definition is even more elusive. The feature or human interest angle is the "good news" story, the offbeat story, the celebrity story. Its concept is best mastered by looking at case histories or by reading, listening and watching to everything the media covers that doesn't seem to be hard news. To be a master of finding a feature peg is to be a master at publicity. In that respect we are talking art, not science.

Look for a story in anything or everything. Capitalize. Think about the concept of the teachable moment, that opportunity which suddenly presents itself, begging for interpretation. And make that teachable moment a "publicizable moment." Forget the form. Think of ways that you can create publicity without a press release.

Perhaps most importantly, acknowledge to yourself that what you are doing as an educator is a great and honorable pursuit, worthy of media coverage. And if you love what you promote and teach, your enthusiasm will be infectious.

References

[1]Breslav, Marc, "A Professional Approach to Public Relations." In: Proceedings of the General Sessions, 1987 National Interpreters Workshop, pp. 15-17, 1987.

An Outdoor Classroom: Georgia's Environmental Education Program

Diane L. Davies, Extension 4-H Specialist
Environmental and Natural Resources
Eatonton, Georgia

Abstract

This session will highlight the development of the University of Georgia's Cooperative Extension Service Environmental Education Program. Emphasis will be placed on marketing strategies, fund raising, program diversification and resulting interagency cooperative ventures.

The WILD Colorado Fund: A Cooperative Venture Providing Support for EE Action Projects in Schools

Carol Bylsma Jones, Project WILD Coordinator
Colorado Division of Wildlife
Denver, Colorado

Abstract

Through combinations of funding strategies, the WILD Colorado Fund sponsored by the Colorado Division of Wildlife, offers habitat improvement grants resulting in diverse projects with surprising spin-off benefits to the agency, students, teachers, and community.

From Nuisance to Wetland: The Story of One School's On Site Outdoor Laboratory Development

Deborah B. Keammerer
Stoecher-Keammerer Ecological Consultants
Boulder, Colorado

Abstract

The development of a complex, functional wetland ecosystem adjacent to an elementary playground will be presented, including interagency

cooperation, promotion, fund raising, curriculum, and volunteer coordination for site development.

NAEE's Long-Range Plan

Edward J. McCrea
U.S. Fish and Wildlife Service
Washington, Viginia
and
Lou Iozzi, Rutgers University
New Brunswick, New Jersey

Abstract

A plan to guide NAEE's development over the next five years has been drafted by the planning committee and is being widely disseminated for review and comment. Key features of the plan include the creation of an endowment fund and a major membership drive. Interest from the endowment fund and revenue from increased membership will be used to create a more comprehensive package of member services, strengthen Headquarter's functions and allow NAEE to assume a more substantial coordination and leadership role in the environmental education field. Participants in this session will be briefed on details of the plan and then will have an opportunity to discuss and comment on plan concepts.

Bringing Home the Rainforest

Carol Smart, Education Coordinator
World Forestry Center
Portland, Oregon

Abstract

As hosts of the Smithsonian Institution Traveling Exhibition "Tropical Rainforests: A Disappearing Treasure," we initiated a volunteer guide training program, created a leading library of resource materials, organized field trips, and produced a newsletter.

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Strand 8

Materials and Programs for Educating About the Environment

ECO-ACT: A Model Environmental Leadership Program

Barbara Addelson
ECO-ACT, Missouri Botanical Garden
St. Louis, Missouri

Abstract

This environmental leadership program disseminates ecological and environmental concepts at St. Louis area schools by training high school students to teach elementary school children. Teaching techniques include hands-on activities, first-hand investigation, immersion experiences in the natural world and community action projects. Presentation to include: slide show and environmental leadership activity.

NOVA "State of the World " Series: NAEE and CEA Members Urged to Participate

Anne M. Blackburn, Outreach Coordinator
State of the World TV Series
Wayland, Massachusetts

Abstract

Late in 1990 NOVA will air a ten-part series on the global environment. A tele-course, video-tapes, and study-guide will be available. An Outreach Program will encourage NGOs to draw the broader public into the search for solutions.

An exciting opportunity lies ahead for all who are working to raise awareness about environmental issues.

Beginning in the fall of 1990, a ten week series on global environmental concerns will be televised in up to 90 nations. The series is being created by WGBH in Boston, Massachusetts, producers of NOVA — public television's distinguished science documentary series. **State of the World's** producers are working closely with the Worldwatch Institute, the Washington-based, internationally respected center for the study of global natural resource issues, and with a panel of distinguished advisors from research centers, universities, industry and national and international agencies. The Executive Director of the Global Tomorrow Coalition — a non-profit, publicly supported coalition of more than 115 organizations with combined memberships of over eight million people — is representing the non-governmental community on the advisory panel. The programs are also being produced in collaboration with Film Australia and the University Grants Commission of

India to help assure that an international perspective is maintained throughout the series.

The ten programs will examine all the major environmental questions facing the world today, including: population growth, soil erosion, species loss, the destruction of forests, and climate changes induced by human activity. Each segment will analyze problems and show efforts toward solutions. The series intends to sound alarms and to suggest ways out of the dilemmas that have been created.

One of the major goals of the series is to help its audiences better understand the web of interconnection that exists among the individual resource issues. The series' creators believe that this understanding is an essential step in balancing human plans and environmental capacities.

Thus, while each of the ten programs will stand alone, key themes will be woven into the entire series. The themes include:

Sustainability — the relationship between viable human social, political and economic systems and the supporting natural resource base;

The Interconnection of Economy and Ecosystem — how the essential web of natural cycles, resources and biological systems is linked to human activities; how soil erosion affects food process, or deforestation, the cost of lumber and availability of housing;

Short-Term Versus Long-Term — the need to reconcile present-day economic expectations (which are most often measured in fiscal quarters) with long-term environmental realities;

Tradeoffs — finding solutions to environmental problems often confronts individuals and governments with difficult economic and moral choices. How can we better balance economic and environmental interests, and public versus private rights; and

Decision-Making and Uncertainty — reliable information about complex environmental problems is often scarce and fragmentary, yet delayed decisions may only exacerbate the problem. **State of the World** will examine the tension that lies between available knowledge and available time.

These themes will appear and reappear within the individual programs, as:

Program One: Examines how the environment has been transformed from the concern of a small number of scientists and citizen activists to emerge today at the center of the international political stage, as human activities are showing effects on a global scale for the first time in history.

Program Two: Explores what we know and don't know about how our planet's climate works, and the dangers that may lie in altering our atmosphere.

Program Three: Looks at acid rain, air and water quality, and the demands and wastes of the modern consumer life-style, and asks, what price is being paid for industrial society? How can current western ways of life be made more environmentally sustainable?

Program Four: Discusses the routes to sustainable development in lesser developing nations, where development and environment have often been seen as mutually hostile concepts.

Program Five: Probes efforts of ordinary citizens and scientists around the world to use energy in more environmentally compatible ways; and looks at the roots of the political and economic inertia that keeps most energy policy mired in the past.

Program Six: Searches out farmers in the Third World and industrial nations who are finding ways to work with nature — to feed the world's population without mining the planet's soil and groundwater in unsustainable ways.

Program Seven: Looks, under the general topic of "Pollution Prevention Pays," at household and toxic wastes and sewage, and at how we can generate much less without endangering industrial output or profits, and at how we can dispose of what's left with minimal environmental impact.

Program Eight: Explores efforts to restore particularly damaged natural ecosystems and preserve particularly threatened ecosystems before it is too late.

Program Nine: Compares how three governments with different geographical and developmental conditions have formulated environmental strategies, and looks at the factors that have shaped the attitudes of the decision makers who are leading these important efforts.

Program Ten: Examines whether global environmental problems and the deterioration of basic planetary life-support systems are beginning to bring an end to centuries old global rivalries, and to force nations to redefine

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what is meant by "national security." How profound is the change that is underway?

During the ten weeks that the series airs, a number of other educational activities will occur. These include:

Videotapes of each program, appropriate for use in high school classrooms, teacher training programs and public education efforts, will be available for sale;

State of the World Teachers Guides, prepared in cooperation with the National Science Teachers Association, will be distributed to one hundred thousand high school teachers of environmental science, biology, general science and social studies;

An Undergraduate-Level Environmental Studies Course, based on the series, is being created with accompanying print materials to enable colleges to offer a course they might not otherwise be able to provide;

The Global Tomorrow Coalition's Citizens Guide to a Sustainable Society is being updated for redistribution in association with the series;

Special Screenings will be arranged for ambassadors to the United Nations, Members of Congress, and other key leaders in the United States and Canada;

Science Museums and Libraries are being encouraged to set up displays relating to the series; and

The 335 Public Broadcasting (PBS) Stations across the nation will be encouraged to organize local environmental news coverage timed to coincide with the national broadcast of **State of the World.**

Collaboration is Wanted with NAEE and CEA Members and Others Who are Concerned about Environmental Issues

As one can see, for ten consecutive weeks, a thoughtful and probing examination of critically important global environmental issues will be available to people in many parts of the world, including the United States and Canada. But for that to make a real difference, broad numbers of people will have to watch the series and get inspired about doing something to resolve the problems that are discussed. And that's where NAEE and CEA members come in. The WGBH Educational Foundation, which will be coordinating all the supportive activity that accompanies the series, hopes that, in addition to the activities cited above, NAEE and CEA members will help support the series by publicizing the programs through their organizations' regular newsletters and events, and by holding some sort of public education or community action project in conjunction with the series. Supportive activities might include:

Speaking before school or community groups, or appearing on local radio or TV;

Holding a discussion open to the public on how environmental needs and opportunities in your community compare to the global situation;

Setting up or expanding local recycling efforts;

Providing information on safe disposal of household toxic wastes;

Carrying out a tree planting, erosion control or beautification project or neighborhood or park cleanup;

Setting up a natural study area at a local school; or

Working toward the adoption or implementation of a needed local ordinance.

If NAEE and CEA members choose to conduct projects in support of the **State of the World** series, please let the Outreach Coordinator at WGBH know what is planned and who will be involved in carrying it out. The Coordinator will share that information with others who respond, and will alert local Public Broadcasting stations about activities that are being planned for their part of the country.

Through publicity provided by a wide range of organizational newsletters and events, larger and larger numbers of people can be encouraged to watch the vitally important **State of the World** series; and through local activities carried out in conjunction with the series, more people can learn how to become more actively involved in the search for solutions.

We welcome your participation and are grateful for your help!

For further information contact:

Anne M. Blackburn
Outreach Coordinator
STATE OF THE WORLD
WGBH Educational Foundation
125 Western Avenue
Boston, Massachusetts 02134
USA
(617) 492-2777 [Ask for the Print and Outreach Department.]

Education in Action: A Community Problem Solving Program for Schools - Detroit Public School System

Jim Boll and Arjen Wals
School of Natural Resources, The University of Michigan
Ann Arbor, Michigan

Abstract

This slide-paper presentation presents the development and implementation of a community environmental problem solving program for the Detroit Public School System to: integrate the basic disciplines, improve the learning and instructional goals, and further the quality of the community environment through education.

Trees as a Starting Place:
Using Project Learning Tree as a Curriculum Supplement

Karen Caddis-Burrell
Fort Collins, Colorado
Presenters: Karen Caddis-Burrell, Ray Mehaffey,
Jarna Tillman, and Mike Way

Abstract

Using trees as a starting place, Project Learning Tree (PLT), a nationally-sponsored program, provides educators who attend a PLT workshop, with resources and interdisciplinary supplemental activities helpful in implementing and enhancing environmental education in existing curriculum.

An Overview of Project Learning Tree

Project Learning Tree is a nationally-sponsored program that uses trees, plants and the forest community as a starting place to integrate environmental education into existing classroom and curriculum. It is a supplementary and interdisciplinary resource for educators, foresters, park and nature center staff, youth group leaders and others interested in helping children develop creative problem-solving and critical thinking skills needed in facing today's issues and decisions concerning the natural world. PLT emphasizes teaching children **how** to think, not **what** to think.

At PLT's core are two activity guides, in elementary and secondary editions, that contain over 170 lessons and activities. PLT participants attend workshops staffed by PLT facilitators who familiarize participants with the activity guides, and PLT's concepts and principles. The workshops also provide participants with other resource materials and opportunities to experience and use selected PLT activities. PLT believes that the most effective environmental education programs emphasize student interaction with the natural and social environment. Using the out-of-doors as a learning laboratory is emphasized throughout the materials, at all grade levels.

Project Learning Tree's History

PLT was first initiated in the 1970's when the American Forest Institute commissioned the Western Regional Environmental Education Council (WREEC) to create a program that elementary and secondary teachers could use in helping students understand their interdependence with the total forest community and develop the skills and commitment needed to use these resources wisely. WREEC made a conscious attempt when creating PLT to present a balanced approach to both industry and environmental groups as they relate to the forest community (WREEC, a group of educators and resource management personnel from 13 western states, develops environmental education materials and programs).

Prior to releasing the PLT materials created by WREEC there was an extensive field test. Over 3,000 educators and school administrators participated in 150 one-day workshops conducted by PLT staff and WREEC members before using the materials with their students. An independent testing organization was employed to conduct a formal evaluation of the program in terms of student accomplishment, and those who participated in the workshops were encouraged to write in comments as to their experience with the materials in classroom situations (PLT Activity Guide 1987). On the basis of these recommendations the materials were revised, deletions made, and new materials added as needed. The final result of this feedback was the PLT philosophy, workshop format and handbooks.

PLT Goals and Principles

PLT's philosophy and curriculum framework is based on seven main principles that follow a developmental progression from awareness to lifestyle. These consist of:

Environmental Awareness: Providing experiences in sharpening senses and appreciating nature.

Diversity of Forest Roles: Developing an awareness of the importance of forest resources and the many ways they relate to the environmental, economic and sociological health of the region, the country, and the planet.

Cultural Contexts: Developing an understanding of the impact of our forest environments in shaping the political, economic and sociological events of the past, present, and future.

Societal Perspectives on Issues: Understanding the viewpoints from which various interest groups judge contemporary forest and environmental issues and understanding the communication processes by which these issues are resolved and ways in which the outcomes may be influenced.

Management and Interdependence Resources: Developing knowledge and skills for the intelligent prediction and evaluation of the impact of specific management policies on the forest and its interrelated communities.

Life Support Systems: Emphasizing the interwoven nature of our planet with a close look at the short-term, and more importantly, the long-range effects of manipulating various segments of these systems.

Lifestyles: Evaluating and modifying our own lifestyles using knowledge acquired in the first six principles (PLT Activity Guide 1987).

PLT activities touch upon ideas contained in one or more of the principles. Each subsequent principle builds on and extends the learnings emphasized in previous principles. All seven principles work toward developing student attitudes, knowledge and skills from basic awareness to lifestyle incorporation.

Basic Project Learning Tree Workshop Components

The meat of PLT, besides the activity guides, is the workshop. The central purpose of a PLT workshop is to encourage teachers to approach learning and teaching with an environmental perspective, to prepare teachers and other educators to use the PLT materials with their students, and to create a setting in which teachers, resource personnel, and others can meet and share information, encouraging continued communication and support for environmental education (PLT Workshop Handbook 1986). One of the major strengths of PLT workshops lies in their "triad" approach. Each PLT workshop facilitator team is composed of individuals in three professional areas: education, resource management, and private industry. Each team member contributes their professions' skills and knowledge to a PLT workshop and adds to the balanced approach of PLT.

To obtain PLT activity guides, an individual must participate in a PLT workshop. The workshop provides the participant with information on guide usage, resource material, background, curriculum planning, and activity implementation. PLT workshops are 8 or 16 hours long and usually take place in either two one-day sessions of four hours each or two sessions of 8 hours each. College credit can usually be obtained through special arrangement with local universities. A typical workshop will begin with a brief introduction to PLT, and its background and goals. The guides are examined and explained and usually workshop attendees participate in two or three activities supervised by PLT staff. A typical PLT activity consists of these components:

1) Suggestions of subject areas the activity is most applicable to.

2) The grade level the activity is most appropriate for.

3) A listing of the PLT principle, or long-range goal of the activity.

4) A list of concepts or a more detailed statement of the main ideas underlying the PLT principles as they appear in the Curriculum Framework Appendices in the back of the guide.

5) A list of skills or intellectual processes which the activity attempts to develop and/or refine.

6) A statement of the objective or specific learning outcome to be anticipated through the use of the activity.

7) An explanation of the instructional procedure needed to implement the activity.

8) Variations or alternatives to the activity (PLT Activity Guide 1987).

PLT facilitator team resource specialists provide information and materials on trees, plants and forests and where to obtain further information and materials. Participants then practice using an activity in their classroom and then present their findings and the activity at the next workshop. A portion of the workshop is spent in illustrating how the guides can be used in curriculum planning. This section is explained by a PLT team educator who has experience using PLT material in the classroom. The workshop is concluded with a summary of PLT's goals, responses to questions, and an evaluation of the workshop. The guides are received as part of the $7 to $16 fee for the workshop. Resource materials provided by the state resource agencies may also be available free.

How To Become Involved In Project Learning Tree in Your State

In 1985 the Colorado State Forest Service (CFSF) took the lead in implementing PLT in Colorado. PLT teams in 15 districts throughout the state are made up of CSFS personnel, educators, administrators, local community leaders, industry representatives, and other resource agency personnel. The emphasis is on local ownership. Colorado's state PLT coordinator is Mike Way, CSFS. PLT is implemented in Colorado by means of a statewide advisory task force and through CFSF district offices. The end goal is teacher workshops.

The NAEE conference PLT interact fair session will provide opportunities to sign up for workshops in the various PLT districts in Colorado. Workshop contacts for the other 49 states PLT is active in will also be listed.

Conclusion

PLT is an environmental teacher education program that believes in letting professional educators do the teaching. Since the 1970's over one-hundred thousand educators and countless more resource management professionals have participated in PLT and become a part of the network working to create an awareness of the interrelationship between living and non-living things.

References

Project Learning Tree Colorado Leadership Workshop Resource Book. 1987. Colorado State Forest Service.

Project Learning Tree Supplementary Activity Guides For Grades 7-12 and K-6. 1987. American Forest Council.

Rensel, J.. 1987. Project Learning Tree Workshop Handbook. American Forest Institute.

How To Plan a Successful Overnight Field Trip for Secondary Students: The Bio-Environ Field Experience - A Twenty Year Program

Janet Chu, Biology Teacher
Fairview High School
Boulder, Colorado

Abstract

The Bio-Environ Field Experience has operated for twenty years bringing eighty Biology, Geology, and Global Science students to the Rocky Mountains. This three day trip offers seven varied field activities at any one time. Some are strenuous (such as cross country skiing to reach the alpine), others are less demanding (such as water studies of beaver ponds and streams). Nineteen adults serve as naturalists including seven teachers from Fairview High School. Twelve scholarships were provided to students who were in need.

New: The Earth Kinship Trail and Nature Guide

Michael J. Cohen, Ed. D.
National Audubon Society
Sharon, Connecticut

Abstract

Learn the theory and application of a self-empowering nature reconnection technology whose 44 hands-on activities evoke 33 subliminal tension signals. By rejuvenating these signals, the natural world within and without beneficially organizes, perpetuates and re-generates itself.

The statement, "When you pick a flower you trouble a star," beautifully suggests that in nature everything is interconnected. The great naturalist John Muir substantiated this, noting that in the natural world when you try to move one entity you find that it's "hitched" to everything else.

Today, modern science confirms these observations by recognizing that Earth is a global life system of which people are part. Bioregionalist Frank Traina describes the system as actually being our other body, for biologically, all our life functions are a seamless continuum of Earth's metabolism.

Our relationship to the planet is like that of a newly formed overhand knot in an ancient rope whose enduring fiber consists of natural bonds; amazingly, the rope creates us and flows through us, we embody the rope, we are it. We are only as healthy as the rope.

In order to be part of a life system (or any system or community), any entity - including a person - must, in some way, be in communication with the system, otherwise that entity will act independently of it. The vital question that this guide addresses is by what means does the global life system intercommunicate and thus harmoniously organize, regulate, perpetuate, and regenerate itself and its members?

Strange as it may at first seem, the guide empowers modern people to rejuvenate the natural world's communications within themselves in order to find nature's balance and ethic.

Studies show that modern Americans spend over 95% of their time indoors ignorantly, fearfully separated from nature. Many educators believe that in the final analysis, this separation of ourselves from the natural world and its intercommunications creates our excessively violent, polluted lives. The irresponsible rift has trashed three continents and our peace of mind.

For three decades I have developed educational programs that establish close, healthy person-planet relationships. For this reason, in November 1988, World Peace University and the Center of the University for Peace, United Nations commissioned me to write a guidebook that shares some of my nature connecting knowledge.

Presently entitled The International Field Guide to Connecting with Nature, the manuscript draws from my National Audubon Society Expedition experiences as well as the workshops of 16 outstanding outdoor and environmental educators. It consists of 70 sensitizing activities that enable a person to know nature as nature knows itself. Uniquely versatile, it works equally well in all kinds of habitats and life zones from the mountains to the sea, backyard to backcountry. The field guide is designed to help outdoor enthusiasts, naturalists and environmental educators, as well as educators from other disciplines and the public, discover the deep lasting values of the natural world.

Connecting with Nature adds absorbing new scientific and psychological dimensions to hikes, campfires talks, and nature walks, as well as nature interpretations, solos and outings. It contains self-empowering environmental ethics, games, explorations, projections, exercises, analyses, imageries, role plays, transferences, writings, physical activities, personifications, meditations, songs, readings, walks, and daydreams. The 80-page handbook may also be used as a course or for independent study. In addition to adding new dimensions to most outdoor activities, it serves as a supplement to already established nature trails and to the companion reading How Nature Works: Regenerating Kinship with Planet Earth (Stillpoint).

The guide lists nature's 53 different integrating senses. These senses make up a non-verbal intelligence which weakens or dies if not exercised. Although most of nature's 53-sense natural intelligence exists within us, our modern lives are painstakingly programmed to quantitatively and qualitatively know the world mostly through four of these senses: sight, sound, rationality (logic, science, and research), and language (abstract symbols and images). These so powerfully imbue our intellect that they overshadow our awareness and reactions to the many other natural senses within and about us.

Connecting with Nature addresses this problem by identifying, validating, resonating, strengthening and instilling trust in nature's 47 other senses by which the natural world knows and organizes itself. In an excessively nature-separated society, such as ours, it is extremely rational to learn to relate to nature through these other senses. Certainly we can't expect the illiterate natural world to evolve modern abstractions and language in order to communicate its ways to us; instead we must hear and heed its signals.

Earth's continually deteriorating social and natural environments show that our disconnected modern society has created runaway havoc. Connecting with Nature rejuvenates a living person-planet equilibrium. This welds modern people to nature's harmonious vitality, rejuvenating some of nature's stability and peace within our excessively frantic, violent lives.

In conjunction with a forthcoming Earth-Aid Concert, The International Field Guide to Connecting with Nature will be published in December 1989 by Michael Kesend Publishing and be available from book stores, the publisher, or by mail order from World Peace University, Box 10869, Eugene, Oregon 97440. You may obtain information about the Earth Concert by writing Earth Concert, Anse St. Jean, Quebec, Canada GOV1JO.

Connecting with Nature: An Earth Kinship Trailwalk Practicum

Michael J. Cohen, Ed.D.
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Abstract

At 8:30 a.m., this two hour, outdoor, writing and discussion activity engages in self-empowering exercises, imageries, solos, readings, transferences and reinforcements that let you know Nature as Nature knows itself. It offers absorbing new scientific and psychological dimensions for hikes, personal growth and nature interpretations (see Earth Kinship Trail Abstract for details).

Alienation and Connection: The Environment in Nineteenth and Twentieth Century English Poetry

Laura Cowan, English Department
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Peggy Cowan
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Abstract

This presentation examines the relationship between people and their environment as it evolves in nineteenth and twentieth century English poetry. It begins with early nineteenth century poets congenial relationship with nature. We will study the decline of this relationship due to the scientific and technological advances of the industrial revolution. People's increasing alienation from nature resulted in psychological duality and stunted imaginations. We will examine the different ways poets have confronted these crises and suggest ways for including literature in environmental studies classes and the environment in English literature classes at the high school or the college level.

Nineteenth-century English Romantic poets turned to Nature with a remarkable intensity because of their century's unprecedented scientific and technological changes. While these advances materially improved most English people's lives, they also robbed them of religion and shook the foundations of their ironclad social structures. These disruptions caused the Romantic poets to mourn the loss of spiritual transcendence and to long for permanence through an escape from the materiality and temporality of our mundane world. According to the Romantics, nineteenth-century people were all Type-A personalities, wasted through their preoccupations with the material world and the frantic pace at which they earned their livings. This obsession with things and time had killed their souls and deadened them to the wonders of their environment—in this case, nature. They longed to reconnect with nature and consequentially to recover their souls and transcendence. Unable to turn outside themselves to religion or to science for the means of this connection, the nineteenth-century poets exhorted their fellow humans to look within themselves to the visionary powers of the imagination defined by Samuel Coleridge as a "magical power . . . that blends and . . . fuses [and] reveals itself in the balance or reconciliation of opposite and discordant qualities" (Coleridge, 1804). The goals were transcendence and permanence; the means were the unifying and visionary powers of the imagination engaged with Nature. And the Romantic poets achieved their goals.

However, the century marched on and civilization brought with it more and more discontents so that twentieth-century poets no longer felt the Romantics' visionary power to unite with nature. The nineteenth-century John Keats was able to join his "immortal" nightingale, whom he addressed as "Darkling" (Keats, "Ode to a Nightingale," 1819). However, Thomas Hardy is unable to join with his decidedly mortal, "frail," "gaunt" "Darkling Thrush" (Hardy, 1900). Hardy's poem suggests modern people's limited imaginations through the speaker's lassitude, the bleak landscape which Hardy is unable to redeem, and the poem's comparison of tree-stems to the broken strings of a lyre, the traditional emblem of poetry.

In "Adonais," his elegy for Keats, the Romantic poet Percy Shelley was able to console himself and his readers with the fact that Keats' spirit lives on in Nature:

> He is made one with Nature; there is heard
> His voice in all her music, from the moan
> Of thunder, to the song of night's sweet bird;
> He is a presence to be felt and known
> In darkness and in light, from herb and stone. (Shelley, 1821)

However, the atrocities of modern warfare do not allow Wilfred Owen to claim such transcendence. The speaker in "A Terre" compares himself to a dug-out rat and mocks Shelley's elegy to Keats:

> "I shall be one with nature, herb, and stone,"
> Shelley would tell me. Shelley would be stunned:
> The dullest Tommy hugs that fancy now.
> "Pushing up daisies" is their creed, you know. (Owen, 1918)

Humans have achieved the ultimate degradation: no spirit; no soul; they are pure matter, earth and worms.

T.S. Eliot's poems most vividly dramatize the poverty of the modern imagination and people's alienation from their environment. The opening of "The Love Song of J. Alfred Prufrock," for instance, contrasts markedly with Romantic poems which celebrated nature with brilliant metaphors. Eliot's poem begins with an ugly, but indescribable horizon:

> Let us go then, you and I,
> When the evening is spread out against the sky
> Like a patient etherized upon a table; . . . (Eliot, 1917)

What kind of a landscape is this? Dismal, certainly; flat, maybe; but it is hard to say much more. This description tells us much more about the mind which creates it than the world that it describes. It tells us about a failed imagination; about a mind which is numb and unable to connect with the world around it. Eliot's poems are full of paralyzed characters and desiccated landscapes, as the title of his masterpiece, The Waste Land, suggests.

The modernists of the twentieth-century do not blame nature for their failure, but themselves. Their alienation results from their state of mind which Eliot defines as a "dissociation of sensibility" (Eliot, 1924). This is the opposite of the unifying imagination which Coleridge described. Central to this dissociation is a duality between reason and emotion. The opposite of this dissociation, according to Eliot, is a "mechanism of sensibility which could devour any kind of experience:"

When a poet's mind is perfectly equipped for its work,
it is constantly amalgamating disparate experience;
the ordinary man's experience is chaotic, irregular,
fragmentary. The latter falls in love, or reads
Spinoza, and these two experiences have nothing to
do with each other, or with the noise of the typewriter
or the smell of cooking; in the mind of the poet
these experiences are always forming new wholes.

All of the major modernists decry some sort of dissociation and desire to regain what W.B. Yeats called a "Unity of Being." Yeats' poem "Among School Children" ends with a paradigm of the modernists' ambition:

O chestnut tree, great rooted blossomer,
Are you the leaf, the blossom or the bole?
O body swayed to music, O brightening glance,
How can we know the dancer from the dance? (Yeats, 1928)

The chestnut tree is neither leaf, flower, or trunk, but all these things; it cannot be understood except as a whole. And we cannot know the dancer from the dance: the dancer's movements embody the dance's abstract patterns so that dance and dancer are one.

Modern poetry at the beginning of the Twentieth Century was incredibly various, but its goals were not. Ezra Pound, Yeats, Eliot and many of their contemporaries sought to heal their divided souls through an organic poetry which mimicked the coherence of Yeats' chestnut tree and dancer. It is difficult to define what this poetry of "being" is, but it is easy to say what it is **not**. It is first of all not intellectual. The modernists blamed the duality between reason and emotion and between man and his environment upon elevation of the intellect: "I think, therefore, I am alienated," they might have said.

Because of their opposition to the intellect, the modernists attacked rhetoric and discursiveness and championed a poetry of **things** rather than **ideas**. This, in brief, was the Imagists' enterprise: to create a concrete poetry of "being." Pound's "In a Station of the Metro" is the quintessential Imagist poem:

The apparition of these faces in the crowd;
Petals on a wet, black bough. (Pound, 1914)

The poem captures Pound's impressions of a series of beautiful faces which greeted him while he was walking out of a subway train on a wet, cold day. Pound called an "image" "an intellectual and emotional complex in an instant in time" (Pound, 1918). This poem tries to communicate the thoughts and emotions of the momentary revelation which occurred on that cold day. Through this quick, spare, concrete style, Pound would make his audience experience the same ecstatic shock of recognition that he felt. The word "apparition" helps him achieve his goal: one of its meanings—"an immaterial appearance which seems real, and is generally sudden or startling in its manifestation"—captures the full nature of Pound's experience; moreover, its supernatural connotations, as well as its elevated tone, lend distinction to the event. The comparison of the faces to petals contributes to the bittersweet impression of this exhilarating, but poignant moment. Pound was struck by the beauty, but also the fragility of these faces against the tawdry walls of the subway: these resemble petals which alight for a moment on a wet bough, but will soon fall to be crushed underfoot. In spite of their transience, Pound has managed to give the faces and their impression some permanence—to wrest some stability from the delirium of our busy lives amidst the frenzy and swelter of the city and the unrelenting progress of time. He does this in part through the lack of verbs. Verbs place us within time; by denying his poem verbs and using mostly nouns and adjectives—the parts of speech called substantives—he gives substance and permanence to the faces and also to his and our experience.

A poetry of "being," thus, restores some of the stability and unity that the progress of civilization threatens. The modernists' desire for unity is also abetted by their poems' demands upon their audience. Pound's poem cannot succeed if it merely **tells** us about his vision; we must experience it ourselves.

My final example, Yeats' "Lapis Lazuli," achieves just such reader involvement. Its political meditation upon World War I and the possibility of another war introduces a discussion of the unavoidable tragedy of our lives—all those things which have troubled the poets we have been studying. The poem then, rather unexpectedly, concludes with the speaker's reflections on a Chinese statue of lapis lazuli:

Two Chinamen, behind them a third,
Are carved in lapis lazuli,
Over them flies a long-legged bird,
A symbol of longevity;
The third, doubtless a serving-man,
Carries a musical instrument.

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Every discoloration of the stone,
Every accidental crack or dent,
Seems a water-course or an avalanche,
Or lofty slope where it still snows
Though doubtless plum or cherry-branch
Sweetens the little half-way house
Those Chinamen climb towards, and I
Delight to imagine them seated there;
There, on the mountain and the sky,
On all the tragic scene they stare.
One asks for mournful melodies;
Accomplished fingers begin to play.
Their eyes mid many wrinkles, their eyes,
Their ancient, glittering eyes, are gay. (Yeats, 1939)

A brief description of the actual details of the carving leads into an entire stanza of speculation. We do not know what the discolorations or the cracks represent, but they **seem** like a watercourse, an avalanche, or a lofty slope. The speaker talks of a plum or a cherry-branch which decorates the half-way house, but neither are actually in the carving. Nor are the Chinamen playing their songs. All these details rely upon the speaker's imagination; they do not actually exist. Of course, we, the readers, see these things as the speaker creates them. And that is precisely Yeats' point: the power of the imagination to engage with its environment and, thus, to create and to envision (Unterecker, 1975).

The concrete environment is central to the modernists' victory over the tragedies of our lives. The modern imagination needs to be—as Yeats described it—"rooted in the earth." Only things can rescue us from dissipation into abstractions and ideas. It is the interaction between the imagination and a material reality that give their visions permanence and substance. But the modernists' sense of their environment has extended beyond the natural world of the Romantics to include man-made environments, such as a subway or a Chinese sculpture.

Not only the speaker creates; through the concrete details of what are, or what might be, the poem draws its readers into its scene and they create as they climb the hill with the Chinamen—as they interact with their environment. Just as the details of the sculpture cannot contain the sculpture's possibilities, the details of a poem cannot contain its entire meaning. No matter how much I try to explicate Pound's or Yeats' poems to you, I will fail. This is because a poetry of "being" extends beyond definable—and, therefore, limited—ideas. The truths of our existence are beyond any attempt to reduce them to definable or quantifiable essences. It is this potential that non-paraphrasable modern poems of "being" celebrate.

Yeats summed it up in a letter just before he died: "Man can embody truth but he cannot know it" (Yeats, 1955). The Chinamen's song may be as close as we can get.

For, in spite of the insistent tragedies of history and of our individual lives, the Chinamen refuse to play mournful melodies: "their ancient, glittering eyes, are gay" because they realize the truth of two lines earlier in the poem, "All things fall and are built again/And those that build them again are gay." We are caught in a transient, material world, but we are blessed with the ability to participate in and engage with this world—whose very materiality permits spirituality. Their songs, like the lapis lazuli sculpture and the scenes we envision, affirm the power all of us have to counter this tragedy with our own creations created by the "rag and bone shop" of this everyday world (Yeats, 1939).

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The Greenway Experience

Carl Crookham
Denver, Colorado

Abstract

This nationally recognized program features educationally-at-risk urban high school students rekindling their interest in graduating, by becoming tour guides. Spanning eighteen years, guides have conducted day-long Platte River tours for over 28,000 children and adults.

I've been explaining the Greenway Experience for almost twenty years. This paper describes the Greenway Experience, clarifies some concepts and applications of the program, and portrays my enthusiasm and the enthusiasm of others for this unique program.

In a Nutshell

This nationally recognized program features educationally-at-risk urban high school students. The program rekindles student interest in graduating by involving them as river tour guides for other youth. Spanning eighteen years, guides have conducted day-long Platte River tours for over 30,000 children and adults.

Lessons from the Greenway Experience can be applied to many settings and projects including:

- From research to application in environmental education.
- Interdisciplinary and interagency cooperative ventures.
- Education about environmental issues and policies.
- Curriculum and teaching strategies.

Alternative Education

The alternative "hands-on" approach to learning has become an important supplement to the Denver Public Schools' curriculum.

Ten miles of the beautiful new Platte River Greenway have been christened, "The Greenway Experience."

The Greenway Experience offers students as well as community groups a unique opportunity to explore an extensive range of topics in and exciting learn-by-doing atmosphere. The tours and other activities of the Greenway Experience provide an exciting approach to learning.

Self-Esteem Builder

The Greenway Experience tours program is a students-teaching-students program which uses the Platte River Greenway as its classroom. Students enrolled in the alternative high school are trained as tour guides. They lead classes of elementary children on four hour, six mile educational tours along the Platte River. The guides learn to teach over fifty lessons from all areas of the curriculum. They emphasize the importance of having a positive attitude about the environment, school, family, and country. This program is also a great self-esteem builder for my guides who, for many reasons, were not successful in their home high schools.

Community Involvement

The Greenway Experience represents the first time that the City of Denver, the Denver Public Schools, and private non-profit organizations have jointly adapted and financed an educational program. I work directly with the Parks Department and the Platte River Greenway Foundation, as well as my own high school.

The project was recognized recently when numbers of all three organizations attended an awards presentation sponsored by The Friends of the River. The award received was presented for outstanding use of the Platte River in 1988.

The program directly or indirectly reaches about 15,000 members of the metropolitan Denver community each year. The tours are designed to help create a positive attitude about our environment and our city. It is exciting to be part of something that is pulling the community together, when so many things seem to be trying to pull it apart.

I have always chosen to work with troubled kids. In addition to teaching subject matter, I love the challenge of teaching attitude. These inner city students have had every kind of problem. Young people tend to look at problems as potential failures instead of seeing them as learning opportunities. Failures lower self-esteem. If students don't feel worthy of success, it's possible for them to apply themselves and experience success.

The Greenway Experience builds self-esteem right from the start. The first day of class my students find themselves in the role of the teacher. I explain that students just like them have made an exciting learning experience available to over 30,000 elementary children. I show them slides, pictures and videos of their peers leading tours. Veteran guides help teach the class and their knowledge, enthusiasm and anecdotes soon have the new students believing they can do it. I also charge them with taking responsibility for the safety as well as the education of their tour kids. They also become certified in both first aid and CPR. They soon understand that they will be the "heart" of this truly unique program and should be very proud.

I approach all aspects of this program from a goal of building pride and self-esteem. I have seen amazing turn-arounds. Students with terrible attendance records find themselves going to all their classes. Students, who have always tried to fade into the woodwork, begin taking leadership roles in student meetings. The most exciting change, for me, is when students who come in as defeated teenagers find themselves getting excited about their futures.

The Greenway Experience has evolved steadily since 1970. It began as a 45 minute activity in a small riverside park. It has grown into a tour taking the whole school day and spanning five parks and six miles of river. My excitement, right from the start, has been in the value of the program to the student guides, as well as the tour kids.

For Spacious Skies

Doris H. Cruze
Flood Middle School
Englewood, Colorado

Abstract

What is the sky like this very minute? Can you describe it? If remembering is difficult, you are not alone. Activities and materials in this presentation focus on awareness of and excitement about the sky.

A Howlin' Good Time!

Elizabeth M. Curley, Volunteer Coordinator
Friends of the Burnet Park Zoo
Syracuse, New York

Abstract

A fun, interdisciplinary program has been developed to teach elementary classes, zoo and national park audiences about wolves. The program incorporates creative writing, storytelling, problem solving, values clarification and critical thinking skills.

Birds, Bands, and Bambinos...

Steven E. Den
Cherokee Park, Bluebird Trail
Bellvue, Colorado

Abstract

This program highlights the conservation efforts of sixth graders along the Cherokee Park Bluebird Trail as well as a classroom bird study skin collection to show adaptations and speciating/aging/sexing from duck wings!

Children's Literature as a Source of Environmental Values: Beatrix Potter and English Sense of Place

Carolyn Dobbs
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Abstract

What role does children's literature play in value formation during childhood? Primarily using two British authors, Beatrix Potter and Arthur Ransome, this presentation discusses possible contributions to a child's environmental values.

This paper assumes that many values held by adults are formed during childhood and that one source of these values is books that children read or that are read to them. For those of us particularly interested in environmental values, it is important to discover children's books that offer those values effectively. In order to understand more fully why these values can be presented effectively, it is necessary to focus on the link between the writer's life experiences and the content of the books. This paper will discuss the life and writings of an important British writer who does offer environmental values in her books: Beatrix Potter (1866 - 1943). (My research also includes the life and works of Arthur Ransome (1884-1967); however, for the sake of brevity, this paper will focus only on Potter.)

Beatrix Potter is a household name in England; her work speaks to an essential environmental value in England: sense of place.

In England sense of place *is* characterized by a connectedness with and reverence for the land that is based on a mutually supportive relationship between a specific place and specific people. Land is hallowed; the roots of the relationship dates back to pre-Christian times and grew from spirituality attributed to the natural environment. A land ethic results from this value in which people are not separated from the land historically or in current time. These people act as stewards of the land because of their own well-being of the land.

There are three phases in the life of Beatrix Potter that emphasize the development of her environmental values and the ultimate importance of sense of place in her life. For Beatrix Potter sense of place was clearly a driving force in the unfolding life experiences and choices as an adult. She was ultimately drawn to the Lake District as an adult because of bonding that occurred during her childhood visits. Because she wrote from these experiences that remained alive for her into adulthood, Potter's books are particularly influential for readers, both young and old.

Beatrix Potter's first phase was characterized by her interest in natural history as a child and young woman (1871-1900), the second phase by the content of the books she produced in her primary writing period (1901-1913) and the third phase by here career, after her marriage, as farmer, land owner and resident of the Lake District (1913-1943). Beatrix's childhood was in many ways typical of the well-to-do in the late Victorian times. Raised in London, she was left on her own in her third floor nursery to entertain herself as best she could. This monotony was punctuated by regular holidays into the countryside, primarily Scotland and the Lake District in northwestern England (Cumbria). Her holidays enabled her to be out-of-doors, walking woodland trails and on the lower fells (hills surrounding the lakes). Her father, an amateur photographer, often accompanied her and helped instill strong observational skills. She and brother Bertram often brought back plant specimens and dead and live animals. Very early her interest turned to drawing plants and animals realistically. This interest in natural history was not unusual for her class of this period; in fact, much significant natural history knowledge was developed by "amateur" naturalists of the day. As a youth, she wrote a paper on spore propagation on mould that her uncle, a member of Linnaean Society of London, presented for her. However, when it was determined that the author was, in fact, a young woman, her research was dismissed. It was not until the 1930's that a German scientist confirmed her findings and hypothesis. Unfortunately, she was so disillusioned that she turned away from scientific writing. As her encoded journal, which she kept from ages sixteen to thirty, shows, she continued to be an astute observer of nature although increasingly she seemed to be turning to fantasy. This mixing of natural history and fantasy is indicated by her statement, "I do not remember a time when I did not try to invent pictures and make for myself a fairyland amongst the wildflowers, the animals, fungi, mosses, woods and streams, all the thousand objects of the countryside; that pleasant unchanging world of realism and romance, which in our northern clime is stiffened by hard weather, a tough ancestry, and the strength that comes from the hills." (Potter, 1944)

Beatrix's second phase began officially in 1901 with her private first publication of Peter Rabbit. Her books contribute to the development of environmental values in a young child, especially sense of place. A number of her books are set in two areas of the Lake District: one in the vicinity of Sawrey where she purchased her first farm Hill Top in 1901, and the second in the area near Keswick where she and her family regularly took holidays.

For Beatrix Potter, sense of place is expressed through her watercolor and pen and ink sketches that portray, literally in most instances, the landscape and structures on the land. The configuration and aesthetic power of these places are clear in the illustrations. Most of the stories are quite local and "home" is a distinguishing characteristic in many of the stories.

In Peter Rabbit the story begins in Peter's home with his mother and three sisters; it is only when he trespasses into the home and place of Mr. MacGregor's garden that ill befalls him, and when he makes his escape, it is to home that he returns where he is both punished and protected. Jemima Puddle-Duck's mishaps also occur when she leaves the safety of the rhubarb patch, where her eggs are gathered thereby depriving her of motherhood, to the woods and the abode of the "elegantly dressed gentleman" with "black prick ears and sandy-colored whiskers" who kindly offers her the use of his shelter for her egg-laying. Fortunately, the farm foxhound becomes suspicious and rescues Jemima from the foxy gentleman, returning her safely home. In these two stories it is clear that Jemima, a domesticated animal is at home on the farm and that Peter, a wild animal, belongs in the woods. Johnny Town-Mouse uses a different storyline to show that the home environment is most comfortable: Timmy Willie, the country mouse, cannot be happy in town, and Johnny finds the same difficulty at the farm. In fact, we find one of the clearest statements about Beatrix Potter's sense of place in terms of mutuality on the last page of Johnny Town-Mouse when she interjects her writer's voice to say, "One place suits one person, another place suits another person. For my part I prefer to live in the country, like Timmy Willie."

Her stories introduced children to a number of animal characters; although they were usually dressed and seemed to talk in a human fashion and often to human, they retained, for the most part, their animal characteristics as indicated by habitat, domesticity, food preferences and life histories, especially predator-prey relations. Her ability to represent these characteristics accurately stemmed in large measure from her observations in the nursery and on holiday outings.

After 1905 she prudently invested her income from the books in real estate and farms in the Lake District. In 1913 at age 47 and much to her parents' dismay, she asserted her independence and married a Lake District solicitor who had been her agent for many of her real estate transactions. She left her quarters at Hill Top Farm and moved with William Heelis to nearby Castle Cottage, across the road and in sight of Hill Top. Thus began the third environmental phase in her life.

During the years Beatrix had worked hard to learn farming from her farm manager Mr. Cannon and other local experts. She proved to be as creative, competent and astute in her farming endeavors as she had been as amateur naturalist and children's writer. After trying pigs and Galloway cattle, she finally settled on sheep as a cash crop. To this end she became renowned as a breeder of Herdwicks, a local, ancient variety particularly well-suited for fell pastures, but not particularly well-bred at that time. Her breeding programs resulted in much-improved stock, and she spent most of her time tending her own flocks and participating in local shows as a participant and judge. In 1930 she became the first woman president of the Herdwick Sheep-Breeders' Association.

Through her lifetime she purchased thousands of acres of fell, farm, and lake shore; typically, she chose her properties to preserve aesthetics qualities because of childhood memories or family ties, and most importantly, to hold together productive farms. She immediately sold some acreage to the National Trust (which her dear friend from her childhood Canon Rawnsley had helped to found in 1895) at her cost. She left fifteen farms (totaling over 4,000 acres) and many buildings to the National Trust, including her beloved Hill Top. When her husband died a few years later, he left an additional 250 acres to the trust.

A mutually positive relation with the land gave Beatrix Potter her unique abilities to write and illustrate enduring children's literature; reciprocally, she gave back to the land in the Lake District through her work and donations to the National Trust and through the cherishing of those locations by millions of people who read and were influenced by her writings.

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The Story of a Fierce Bad Rabbit (1906)
The Tale of Jeremy Fisher (1906)
The Tale of Tom Kitten (1907)
The Tale of Samuel Whiskers or the Roly-Poly Pudding (1908)
The Tale of Jemima Puddle-Duck (1908)
The Tale of Ginger & Pickles (1909)
The Tale of Timmy Tiptoes (1911)
The Tale of Mr. Tod (1912)
The Tale of Pigling Bland (1913)
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The Tale of Little Pig Robinson (1930)

Students Collecting "Real World" Data: TVA's Teacher/Student Surface Water Quality Monitoring Network

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Abstract

The Tennessee Valley Authority (TVA) Teacher/Student Water Quality Monitoring Network benefits teachers, students, and a government agency through enriching the secondary school curriculum and providing useful information for water quality management. This presentation features slides, videos, discussions with teachers and managers of the network, handouts including sample materials, training schedules, information on how to organize a "water camp," classroom plans, and administrative guidelines. This program has been successful in six southeastern states, involving over 43 teachers and 116 students from 39 schools in the production of 30 field studies in just three years of operation. Over 4,000 additional students have received classroom instruction as a result of this effort.

The Tennessee Valley Authority, a Federally owned corporation, is best known for its role as the Nation's largest producer of electrical power, serving a region that includes parts of seven southeastern states. TVA is also one of the Nation's largest water resources management agencies, operating an integrated system of 35 large multipurpose reservoirs (5, 6). TVA shares responsibilities for determining the effects of watershed development on water quality within the 38,000+ miles of streams that flow into these reservoirs, identifying pollution problems, and evaluating conditions in the reservoirs with the U.S. Geological Survey, the United States Environmental Protection Agency, and state water pollution control agencies. Even with this interagency cooperation, it is impossible to maintain current information on all streams and lakes.

As both a natural resources management agency and a regional development agency, TVA is involved in efforts to improve environmental education in the region (2, 7). In 1986, a cooperative project was developed by TVA's Water Quality (WQ) and Environmental Education (EE) Programs with the dual objectives of incorporating water management concepts into the secondary school curriculum (4) by means of a science, technology, and science focus and collecting basic water quality data on streams and lakes in the Tennessee Valley (1).

The Teacher/Student Water Quality Monitoring Network (WQMN) is directed by TVA's Water Quality group with administrative and logistical support provided by The University of Tennessee at Chattanooga (UTC). EE assists in planning and conducting project activities. The project is funded by Federal appropriations to TVA for surface water monitoring activities.

Program Description

Applications for the WQMN are distributed in early spring to high school science teachers through TVA's 13 university-based centers for environmental education. The service area of these centers covers approximately two-thirds of the Tennessee Valley (3). Teachers interested in participating in the WQMN complete an application and return it to UTC. Typical questions in the application concern the teacher's previous experience with projects on water quality, why they are interested in participating in the program, what field studies they would like to conduct, and how they would incorporate water quality education into the curriculum. During the summer, a committee composed of representatives from UTC and TVA's WQ and EE Program reviews the applications and selects 20 teacher participants and several alternates. Each selected teacher attends a 2-day fall workshop along with two of their students to receive classroom instruction and field training on water quality topics.

TVA scientists, engineers, and education specialists work closely with UTC to organize and conduct the workshops.

The workshop includes lectures on the differences in streams, lakes and reservoirs; water quality management programs developed in response to State and Federal water laws; the quality of water required for various water uses; conflicts associated with managing flows through a system of reservoirs; and practical considerations in designing field studies. Field training includes hands-on experience in water quality testing, invertebrate sampling, and fish collection.

Current movies, videos, and slideshows on water-related topics are also part of the program. Water quality computer software used in the workshops exposes students to the conflicts involved, and complex decisions required, in managing a wastewater treatment plant and regulating water levels and streamflows in a river/reservoir system. Other computer programs focus on identifying reservoirs in the Tennessee Valley, and learning key water quality terms. A packet of educational materials on water quality topics, which includes lists of water quality educational books, publications, audiovisuals, computer software, and sampling equipment is prepared and distributed by the EE Program.

Upon returning to their schools, the teachers and students develop an instructional unit on water resources or incorporate the concepts learned at the workshop into the existing curriculum. They also design and conduct a field study on a local stream or lake and prepare a report. Each teacher participating in the WQMN is loaned a water quality testing kit for use in conducting their studies. Study results are presented at a summer water camp where teachers and students receive additional training. Teachers who have completed their first year in the WQMN travel to one of several national educational conferences to make presentations on their contributions to the program. The teacher's expenses to these meetings are paid by TVA and arrangements to attend the meetings (including assisting with preparing and submitting abstracts) are made by UTC.

The five-day summer water camp conducted by TVA and UTC includes additional classroom and field instruction as well as various water-related recreational activities. A key element of the water camp is a simulation activity in which teachers and students play roles in hypothetical, but realistic situations involving water rights, water quality assessment and protection, wastewater treatment and sewage treatment plant siting, conservation of endangered species, and industrial and urban development.

A nine-minute slide/tape show (transferred to video cassette) entitled "Students Study Water Quality: A Networking Approach" was developed in 1987 to help inform Tennessee Valley teachers about the WQMN.

Future of the Program

From its beginning in February 1986 and through June 1989, 43 teachers and 126 students from 39 schools in 6 Valley states have attended one or more of the workshops and conducted 30 field studies. Over 4,000 students have received some instruction in water resources concepts through the classes of these teachers. Numerous awards and scholarships have been received by WQMN teachers and students as a result of their participation in this program and substantial information has been added to the current water quality database for the region.

The success of this program in developing both useful water quality data and relevant science instruction has assured its continuation for the foreseeable future. A series of advanced workshops has been initiated for teachers who have participated for three or more years in the WQMN and a yearbook documenting results of field studies is scheduled for publication this year.

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National Science Foundation 4-H Marine/Aquatic Education Program (1987-89)

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Abstract

Four-H youth marine/aquatic publications, senior leadership and special audience 4-H marine camps, and adult leader training programs in environmental education will be presented. Programming strategies and results, project publications, and additional educational resources will be shared with participants.

Summer Science Academy

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Abstract

The Summer Science Academy offers high school students an opportunity to live and work at a field research station and become involved in scientific research. Students learn about science and ecological research by working with scientists and doing a research project of their own. The program consists of classes, field trips, and individual research projects in Colorado's Front Range of the Rocky Mountains. High school students work with professional scientists who aid students in developing individual research projects.

GREAT (Groundwater Resources and Educational Activities for Teaching)

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Abstract

Groundwater issues, program design for the six units and posters, in-service strategy for seventh to ninth grade science, and future plans for groundwater education in the state will be highlighted. Groundwater models will be demonstrated.

GREAT (Groundwater Resources & Educational Activities for Teaching) is a program for earth, life and general science in the seventh through ninth grades. Junior high/middle school science is the top priority for integrating groundwater into Iowa schools for two reasons. First, Iowa law (through the 1987 Groundwater Protection Act) now requires water quality issues be included in seventh and eighth grade science. Secondly, earth science is probably the easiest and most appropriate subject in which to incorporate groundwater concepts.

GREAT was designed not only to meet environmental education goals, but also to meet teachers' needs. Teachers consider lack of time to be the biggest barrier to environmental education, including both lack of time in the school day and lack of preparation time (Ham 1987). Therefore, to get a high percentage of teachers to use these materials, the reality of the classroom dictates a balance between hands-on activities and materials that are quick and easy to use.

GREAT materials include: a three-ring notebook with six units, a set of six posters (one for each unit), and a set of groundwater models for student use. The first unit is on hydrogeology, and the other five are on different kinds of groundwater contamination, in order of their importance in Iowa.

Unit 1: Hydrogeology

Groundwater quality is important for at least three reasons.

1) Groundwater supplies drinking water for about 80% of all Iowans, for about 50% of Americans and for virtually all private rural users.

2) Groundwater contamination can affect ecosystems when it recharges lakes and streams.

3) Iowa's economy depends on groundwater for over three-fourths of the water used for livestock, irrigation and commercial purposes (Clark and Thamke 1988).

"Protection through prevention" is the basis for Iowa's groundwater protection policy. It is more feasible, more effective, and less expensive to prevent groundwater contamination than to try to clean it up afterwards. Many ways of preventing groundwater contamination also save energy.

Iowa's groundwater model is a 12" x 6" x 2" plexiglass box with aquarium gravel for aquifers, foam sheets for confining layers, and a lotion pump for a well. It can demonstrate different types of contamination, and other concepts such as the water table, aquifers, and artesian wells.

Other activities in this unit investigate the porosity and permeability of sediments and rocks, and interpret diagrams and charts of Iowa's aquifers and water use.

Unit 2: Fertilizers and Pesticides

Research has shown that higher nitrate concentrations in groundwater over the last 20 years are directly related to the increased use of nitrogen fertilizers on farms (Hoyer et al. 1987). About 26% of Iowa's population are served by water with high concentrations of nitrate. Resulting health risks include not only the "blue baby" syndrome, but also the possibility of increased cancer rates and other disorders.

Pesticides are now being found in low concentrations in shallow groundwater throughout Iowa. Although evidence is lacking regarding health effects from chronic exposure to pesticides, their presence in groundwater clearly indicates water quality degradation.

Some farmers have found they can maintain their profit by reducing the expense of fertilizers and pesticides. For example, less fertilizer is needed if: realistic yield goals are based on soil surveys, nitrogen from manure and legumes is credited, and fertilizer is not applied in the fall when most of it is lost before the plant can use it. Less pesticide is needed if: it is banded along a row instead of broadcast over the field, crops are rotated, and a check for pests is done to see if any pesticide is needed.

Activities in this unit focus on interpreting data on fertilizer and pesticide use and discussing alternatives with farmers.

Unit 3: Abandoned Waste Sites and Landfills

Waste management may be the environmental issue that will most directly affect the lives of every American in the next few years. Landfills have two basic problems: they leak hazardous chemicals into groundwater, and they are running out of room.

Activities on household hazardous materials include inventorying, reading labels, and finding proper disposal methods (and sometimes alternatives) for items such as garden chemicals, paint supplies, used motor oil, and oven cleaners.

Iowa's hierarchy of solid waste alternatives includes:

1) Volume Reduction at the Source

2) Recycling/Reuse

3) Incineration for Energy Recovery

4) Incineration for Volume Reduction

5) Landfills

This hierarchy guided development of activities on alternatives for waste items, purchasing decisions, composting, and recycling paper, aluminum, and plastic.

A case study of an abandoned waste site was used to illustrate the problem-solving process and extremely high cost of cleanup.

Unit 4: Leaking Underground Storage Tanks and Hazardous Materials Handling and Transportation

Gas station tanks are the biggest example of leaking underground tanks. Bare steel tanks that corrode, improper installation, and spills and overfills have caused leaks that threaten groundwater as well as basements where explosive fumes can collect. Best management practices are needed in the handling and transportation of hazardous chemicals such as petroleum products, agricultural chemicals and industrial solvents.

Activities include surveying the community for hazardous materials, and using examples to weigh risks and benefits and to explore best management practices.

Unit 5: Direct Paths of Contamination

Any hole in the ground that reaches an aquifer provides a direct path for pollution. In Iowa, three direct paths of special concern are: agricultural drainage wells, abandoned wells, and sinkholes. Agricultural drainage wells drain wet land or former marshes for crops, especially in north-central Iowa. These pipes carry water and agricultural chemicals directly to shallow aquifers. Abandoned wells must be plugged and sealed properly to avoid carrying surface contaminants to groundwater. Sinkholes are natural holes in limestone bedrock, mostly in northeast Iowa, which can also carry contaminants to groundwater. Sinkholes have also been used for local dumps, further endangering water quality.

Students use groundwater models to see how these wells and holes carry contaminants. They also use maps to relate geological features to these problems, and discuss potential solutions.

Unit 6: Land-applied Wastes and Sewage Treatment

Land-applied wastes include putting manure or sewage sludge on the land for fertilizer. Sewage treatment includes lagoons that store wastes from humans or livestock and septic systems that distribute a home's wastewater over the soil for filtering. Best management practices are needed to prevent nitrates and bacteria (and heavy metals from sludges) from leaching to groundwater.

Activities include investigating soil's filtering capacity and health effects of heavy metals, and the placement of septic systems and lagoons.

In-service Plans for GREAT

There are about 1,000 Iowa teachers of earth/life/general science for the seventh to ninth grades. The goal is to reach 85% of these teachers. Based on a study of different modes of curriculum dissemination that found that short intensive workshops were more effective than longer workshops

(Mayer and Fortner 1987), free one-day workshops around the state will be the major mode of dissemination for GREAT. These will be at the 15 area education agencies (AEA's) and possibly at four of the largest school districts. GREAT materials will also be available by request for a small fee.

A "Train-the Trainer" approach will be used to offer the workshops by training staff from AEA's, county conservation boards, and Extension in September. These trainers will then offer local teacher workshops, with a potential of 14 to 20 workshops offered in the 1989-90 school year.

Other Plans for Groundwater Education in Iowa

Vocational agriculture is the second curriculum priority for Iowa's groundwater education program. Materials have been developed by Iowa State University through a contract from the Iowa Department of Natural Resources. Workshops will be held in the summer of 1989 for 150 to 200 of Iowa's 260 vocational agriculture teachers.

The next curriculum priorities include high school science and upper elementary. Funding will be sought to develop materials for these areas. Brief materials may also be developed for home economics and industrial arts about waste management issues.

Some general information is also needed to meet immediate teacher requests. A booklet on Iowa's groundwater issues will be developed soon to accompany the set of groundwater posters.

Iowa's groundwater education strategy has targeted different subjects and grade levels in order to design materials and teacher training that more effectively meet teachers' needs. By recognizing limitations of time, funding and teacher interest, and by prioritizing curriculum areas, this marketing approach is Iowa's attempt to maximize the effectiveness of groundwater education in the state's schools.

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Greenhouse Education Down Under

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Abstract

The greenhouse effect has a high public profile in Australia and is now being addressed by educators. The content and approaches adopted in recently published greenhouse education materials is described and evaluated.

Introduction

The possible implications of the greenhouse effect on Australia has captured public and media imagination in Australia in the last year or so. Newspapers, news magazines, television and radio current affairs and documentary programs, and public information seminars, forums and conferences have all had a major focus on the greenhouse effect. And the media attention has apparently been successful in arousing public awareness. A national public opinion poll, conducted in early May 1989 (Schauble, 1989), concluded that an overwhelming number of Australians (87 percent of the respondents) regard the threat to the environment as something that must be treated seriously, and the emission of chemicals into the atmosphere was regarded by 40 percent of respondents as the most serious environmental issue in Australia.

While much of the media and other attention has been at the sensationalist journalism level there also have been some interesting developments which could be called "greenhouse education."

It should be noted from the outset that there is confusion between "education" and "information" in many minds in Australia, and professional educators are as guilty of confusing the different intentions of education and information as other groups. The belief that the mere possession of information (knowledge/awareness) will result in a change of attitudes and behaviors unfortunately continues.

This means that much of what has marketed to date as greenhouse education in Australia should more accurately be called greenhouse information. Some of the other materials that have been or are being produced involve new approaches to old activities, and yet others include some innovative action activities within an environmental education framework. The materials which are reviewed in this paper span this whole range of possibilities.

Because of the perceived urgency of the greenhouse problem there has been a rush to produce materials for public and school information and use (and with the pious hope of education too). However, in the rush to publish, much material has been poorly presented or referenced, or has suffered from an overkill in the amount of information contained in the materials. There has also been a tendency in some of the materials to slip back to approaches and activities which focus on increasing awareness and knowledge, and thus are more likely to be readily accepted within the existing subject areas, rather than practicing what environmental education preaches by presenting, what is seen as, more challenging attitude and action oriented activities (which perhaps do not slot in so easily).

Foci for Greenhouse Education

The first major national focus for greenhouse education was a national **Greenhouse 88 Conference**, organized by the Commission for the Future and held in November 1988 in venues around Australia. As part of the build-up to this public conference there were a multitude of items in newspapers, television programs, news magazines and radio programs. These included special supplements, interviews with appropriate experts on the greenhouse effect and lead articles in news magazines and others such as **In Future** (from the Commission for the Future). A short list of these was given in **ozEEnews 37** (the newsletter of the Australian Association for Environmental Education, February 1989).

These items are basically classified as being for information rather than education. They give details of the greenhouse gases, explain the greenhouse effect and make predictions about what could happen if ...

One education kit which was produced and launched to coincide with the **Greenhouse 88 Conference is The Greenhouse Effect - A Global Dilemma.** This consists of a set of twenty color slides plus teachers' notes and is designed for use with middle and upper secondary school students in geography, social studies, science or environmental studies courses. A major positive attribute of this kit is that it makes use of Australian data and examples as well as giving a global perspective. Too often Australian materials contain northern hemisphere data which can be totally inappropriate to the Australian context. The teachers' notes contain well selected background information, which would be suitable for senior students as well as teacher use, and include suggestions for community and personal action for limiting the greenhouse effect and adapting to its consequences. On the negative side, the teachers' notes could have been better designed to make the information and suggestions more accessible, but this does not detract from the quality of the content of the kit.

The second major focus for greenhouse in Australia is **World Environment Day** which is celebrated around Australia on 5 June each year. In 1989 the Australian theme was Living **in a Global Greenhouse.** Each year a number of government and non-government organizations produce materials to help promote World Environment Day and to provide support to school and community groups who wish to focus some of their activities on the Day and encourage community involvement in the environment. From the information available about the materials (in ozEEnews 37 and 38, and McDonald, 1989), the following comments can be made.

The Greenhouse Alert Project of the Social Education Association of Australia (SEAA) is producing an eight page broadsheet with color photographs on one side and information and activities for teachers on the other side. The material is intended for use by upper primary and lower secondary levels. Topics to be covered on the broadsheet are: the fortunate planet, the endangered planet, the breathing planet, the protected planet, the warming planet, the living planet, the whole planet and working with the planet. SEAA are hoping that students will devote time to the activities between World Environment Day and their proposed Greenhouse Alert Day on 1 September.

BEE in a Greenhouse is a booklet which is being produced by the Built Environment Education (BEE) network of The Royal Australian Institute of Architects. The booklet includes twelve self-contained activity sheets for duplication, each with a range of activities suitable for secondary school students. The activities are action-oriented and focus on where the students are located, their surroundings, how they may be affected by the greenhouse effect (and what they can do about it), past, present and future societies, and some fun and games. The accompanying teachers' notes give some additional information and a list of references.

Greenhouse Effect: Education Kit is being produced by the Association for Environmental Education (NSW). It will be a large package containing color slides with commentary, overhead transparency sheets, background notes and questions, investigations, glossary, games and teachers' notes. The materials will include "a new look at old science" (such as the teaching of the carbon cycle) and have an emphasis on the need for all humans to adopt a new approach to the way the environment, especially the atmosphere, is treated.

Conclusion

Greenhouse education down under has to date seemed almost to have been a race between some individuals and organizations to produce materials (and add to the greenhouse effect by accelerating global deforestation in the process). When the dust settles it will be interesting and worthwhile to reflect on the quality of the quantity that has been produced. In the meantime I think I will sit under one of the remaining trees and read **The Sea and Summer (Turner, 1987), a novel about the greenhouse effect down under, and probably the best piece of** environmental education produced on the greenhouse effect to date.

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Education Through Adventure...Starting Young

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Abstract

A unique, residential program for traditional and special education students at the elementary and middle school levels emphasizes environmental education through a combination of outdoor classes and adventure experiences.

Nestled in the San Juan mountains near Lake City, Colorado is a place where challenge and education live side by side. The following is a glimpse of this place and the exciting program that is happening there. The purpose is not to defend the program or to necessarily convince others of its merits. Rather, it is meant to be an introduction.

The place is Camp Redcloud, and the program is outdoor education. Camp Redcloud is a Christian youth camp and conference center which offers programs year round, including outdoor education in the fall, winter, and spring. For this endeavor, Camp Redcloud has entered contractual agreements with the schools so that the primary purpose is educational. A range of students attend outdoor education, consisting primarily of fifth and sixth grade classes from Grand Junction and Montrose, Colorado. In addition, every special education student at the middle school level in Grand Junction attends a session at Redcloud as well as a fair number of seventh through twelfth grade students. Also included are teachers, parents, administrators, and other adult "students" accompanying the classes.

The camp is designed to offer a high quality curriculum to students and teachers. To this end, several goals exist for the program:

1) To enrich students' education by giving them hands-on experience which makes learning and discovery concrete, not abstract.

2) To build environmental awareness in individuals. This includes:

a) an appreciation of the intrinsic value of the outdoors and

b) a desire to be responsible, knowledgeable stewards of our world.

3) To help students experience the joy of learning and discovery and to instill in them the desire to pursue their education.

4) To present students with alternative leisure activities by providing them with exciting and fun opportunities in outdoor recreation.

5) To provide students and teachers with an opportunity to get to know each other better by providing more personal contact in a less structured setting.

6) To help each student realize their value as a person by having a genuine interest in them and encouraging them as they learn and try new things.

To achieve these goals, a variety of classes and activities are combined for the students during their stay at Camp Redcloud. For instance, in the spring forestry can be taught while hiking, lake ecology with canoeing, history along with horsemanship, or zoology and mountain biking. By linking classes with activities, the experiential benefits of outdoor education are maximized. The philosophy is this: the best place and sometimes the best teacher for learning about the outdoors is the outdoors itself. Just as you get to know a friend best by spending time with **them**, not their picture or words written about them, so the best way to know the natural world is to get out in it.

Classes are taught on such subjects as history, soil science, orienteering, zoology, ecology, forestry, creative writing, outdoor survival, and astronomy. In the classes, students learn (or for some review) fundamentals in the subject (e.g., food webs in ecology, photosynthesis and tree identification in forestry, etc.). Straight lecture is avoided, opting to involve the student through questioning and experiences, both planned and spontaneous. The emphasis is on bringing the subject home to the student - "How does this knowledge affect you and what difference can you make in taking care of our world?" The activities are horsemanship, mountain biking, rappelling, canoeing, hiking, fishing, and mine trips. In the winter, cross-country skiing, broom hockey, and ice fishing are added. The activities are designed to challenge the students to have fun in the outdoors and to stretch themselves in terms of what they can do. The classes and activities can be paired in many ways, giving the program flexibility.

A typical session of outdoor education spans three days, (i.e., 3:00 p.m. on a Monday to 1:00 on Wednesday or 3:00 Wednesday to 1:00 Friday.) During that time, students rotate in small groups through four to six class/activity blocks, each 2 - 2 1/2 hours in length. Each student is given an opportunity to try every activity, weather permitting. In the evenings, educational and recreational time is scheduled. For example, the first night might include a guest speaker from the Division of Wildlife followed by a time of singing, games, and group skits. Other possibilities are night hikes, astronomy lessons, and hay rides, to name a few. A sample schedule is included for reference. Sessions for longer periods of time (four or five days) are possible. This allows time to teach more subjects as well as giving more experience in the activities. All activities and subjects are taught and led by trained Camp staff. A staff-to-student ratio of one-to-four or better is maintained.

The program's past performance speaks for the quality of outdoor education at Camp Redcloud. The program was begun in the spring of 1985 with 120 students from Grand Junction schools coming to Redcloud. In the 1988-89 school year 1,203 youth and 149 adults came to Camp Redcloud for outdoor education. This represents 18 schools from Grand Junction and Montrose and includes nine special education classes.

Statistics are not the only measure of the quality of outdoor education. If the goals stated above have not been achieved, the program cannot be considered a true success no matter how many students come to Camp. To measure some of the effectiveness of the program, students and teachers over the years have been asked to evaluate outdoor education by completing various written forms. Here are some of their perspectives. Teachers were asked this spring, "Did the classes encourage learning in a challenging way?" The response was overwhelmingly "Yes" with such additional comments as, "I was impressed with the way the instructors presented their topic and their enthusiasm" and "Very down to earth and practical. 'Real life' skills were offered." The question was also asked, "Was there one class that was outstanding and why?" Answers include: "Canoeing; very good description of food webs" and "I was impressed with the outdoor education class on soil conservation on the hike."

This spring as part of the students' portion of the evaluation process, two classes completed two feedback forms each, one upon their arrival and the second after rotating through all the classes. Some questions were asked both times in order to measure any change in knowledge or attitudes during their stay. One question asked twice was "Where does a tree make its food?" At the start, 20 students knew it was in the leaves, 4 did not answer, and 21 answered incorrectly. At the end of the outdoor education session, 32 answered correctly, 4 did not answer, and 9 answered incorrectly. Another question posed at the end was "What's one thing you learned about yourself that you didn't know before?" Needless to say, this brought a vast array of answers, including: "I can ride a bike 6 miles," "How to read a compass and elevation map," "I could rappel," "I used to not go outside, now I found out you have more fun outside," and "I can have a lot fun without a lot of people." More information on the evaluation of the program is available.

In summary, here are a few of the benefits of outdoor education at Camp Redcloud:

1) It gives students an opportunity to engage in problem-solving activities and discover things first-hand. This allows them to put classroom and book learning into practice.

2) Teacher/student and student/student relationships are enhanced.

3) Students and teachers have a chance to experience the beauty and the fun of the outdoors, thereby encouraging environmental awareness.

4) Students learn about our environment, laying a foundation for responsible stewardship of our natural resources in the future.

5) It increases the students' desire to learn by sharing the joy of discovery with them.

This is one program at one camp. A goal of Camp Redcloud is not to be the only environmental education camp but to be one of many cooperating to teach students about our world. The hope is that this paper may serve to achieve that end. For more information, please contact:

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Outdoor Education - Sample Schedule

Day 1

3:00 - Unload, orientation, divide into groups
3:30 - Class #1
6:00 - Free time
6:15 - Supper
7:15 - Evening program: Games, singing, speaker, etc.
9:00 - Night hike/astronomy
10:00 - In cabins

Day 2

8:00 - Breakfast
8:30 - Cabin clean-up
9:00 - Outdoor awareness (an individual activity)
9:30 - Class #2

11:45 - Free time
12:00 - Lunch
1:00 - Class #3
3:30 - Break
3:45 - Class #4
6:15 - Free time
6:30 - Supper
7:15 - Evening program
8:30 - Hayride/bonfire
10:00 - In cabins

Day 3

8:00 - Breakfast
8:30 - Cabin clean-up
9:00 - Outdoor awareness
9:30 - Class #5
11: 45 - Pack/free time
12:00 - Lunch/awards
1:00 - Departure

High School Outdoor Education

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Abstract

An AV/lecture showing the possibilities of high school outdoor education programs. Information includes money making ideas, low impact camping, foods, snow studies, survival techniques, winter recreation, rock climbing/rappelling, trout rearing, group interactions, and more.

The Soroco High School outdoor education program was started in response to the need for information concerning outdoor activities and their safety. This program grew from a 3-4 week unit in an upper level biology class to the present-day semester class offered to juniors and seniors. As the program has been developed over time, more projects and experiences have been added on a yearly basis. The program is supported by all staff members and is taught on a regular basis by several teachers in the district. The main areas of concern which are covered each semester fall roughly into four categories: group projects, self awareness, trust in others, and environmental awareness. All four areas are interwoven throughout the semester and not presented as separate topics.

Group Projects

The concept that a group of people can accomplish a great deal when they work together sharing ideas and the physical labor is stressed throughout the course. The very first day the students are told of the need to raise the monies needed to support our three day "camp" at the end of the semester. No student is allowed to pay their way to cover camp costs, so the money-making projects must be agreeable to everyone to ensure equal participation by all students. Most often the students will sell some food item, sell candy between classes, and operate a dessert auction for the public.

All large projects, such as the tree plantings at the school and study areas, the wetland project, and the trout rearing project, require group workability in order to get the project accomplished in the given amount of time. Many small assignments taken from Cowstails & Cobras and Project WILD stress group workability in order to solve a problem or work through a given situation. As a culminating activity of our program, the students need to work and live together at camp in the activities presented in that situation.

Self Awareness

Several assignments from Cowstails & Cobras are used to test the student's limits in understanding and following directions, critical thinking with the application of knowledge and control of their emotions. All of the outdoor activities (i.e., cross-country skiing, snowshoeing, rappelling, and rock climbing) teach new skills and encourages each student to find their own limitations. Our survival unit is a definite check on their abilities and self-confidence to know, understand, and apply new knowledge and skills so the students may identify their limitations before the real need arises.

Trust in Others

This concept is presented throughout the course in several different methods and is truly tested in the rappelling/rock climbing experience. Before the "Day on the Rocks" arrives, the students have worked through trust falls, trust drives and "blind" trust activities. Students learn that making mistakes is acceptable, but each mistake should be treated as a learning experience.

Environmental Awareness

Environment use and/or abuse is a concept that cannot be presented as a separate topic, but is discussed anytime a situation presents itself. Some examples of interactions are the discussion of land use and environmental impact of such projects as our new Stagecoach Reservoir, the proposed Catamount ski area, and the Dunkley Pass cross-country ski trails. When working through the Project WILD and Project WILD Aquatics units, discussion will often reflect the beliefs and values of the students involved. Guest speakers are also used to challenge the student's values as the speakers present their ideas and beliefs on different topics that pertain to the use of the outdoors.

The Soroco High School Outdoor Education Program is constantly growing and changing directions, but the underlying concepts of environmental enrichment, self development, and overall success still remain. Outdoor education offers all students a chance to succeed and build self-confidence in a manner not possible in the "inside" classroom.

The following is a list of books that I have found helpful in my outdoor education program.

1) A Sand County Almanac by Aldo Leopold.
2) Camping-on-the-Go Cookery by B. Angier and Z. Taylor.
3) Cowstails & Cobras - A Guide to Ropes Courses, Initiative Games, and Other Adventure Activities by Karl Rohnke.
4) Cross-Country Skiing and Snowshoeing by Erwin A. Bauer.
5) Investigating Nature through Outdoor Projects by Vinson Brown.
6) Outdoor Education - a Manual for Teaching in Nature's Classroom by Michael Link.
7) Project WILD by Western Regional Environmental Education Council.
8) Project WILD Aquatics by Western Regional Environmental Education Council.
9) Teaching in the Outdoors by D. R. Hammerman, W. M. Hammerman, and E.L. Hammerman.
10) The New Complete Snow Camper' Guide by Raymond Bridge.
11) The New Complete Walker by Colin Fletcher.

Environmentalizing Education and Interpretative Materials and Programs for Educating About the Environment

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Abstract

American higher education's penchant for assigning slightly different areas of the curriculum to quite different departments and schools or colleges leads one to emphasize the differences between them rather than their similarities. This presentation shows similarities among and coordination among four course offerings at the University of Vermont dealing *with: Environmental Studies, Environmental Education, Environmental Interpretation, and Citizen Participation in Natural Resource Planning.*

Linkages between concepts for environmental education activities/curricula and themes for environmental interpretation media (especially self-guided trails) and between sites for environmental education field trips and environmental interpretation media (again, primarily self-guided trails) are made, using Burlington, Vermont as the area of study. Application of computer-linked interactive videotape programs to this approach is also explored.

Introduction

My teaching responsibilities for the University of Vermont's university-wide undergraduate Environmental Studies program and the School of Natural Resources's Natural Resource Planning graduate program include:

Senior Seminar in Environmental Studies
Environmental Education
Environmental Interpretation
Citizen Participation in Natural Resource Planning

In each course, I encourage the students to "think globally, act locally" and to consider the connections between projects they work on at the local level and larger state, national, and global environmental issues and solutions. I involve them in real-world projects which are broken down into manageable, bite-size pieces via regular "writing-across-the-curriculum" journal writing assignments throughout the semester. I strongly encourage them to work on these projects as part of multidisciplinary problem-solving teams, and offer advice and guidelines to facilitate cooperative learning and group interaction. Finally, I urge the students to demonstrate their mastery of content and skills via products that are of value not only to themselves, but to the community of which the university and they are a part and to students who succeed them and can build on their work.

The students in each class report that they enjoy interrelating their team projects and other assignments with those of students in other classes I teach and with those of students who preceded them in the same class. They acknowledge that they come to know something much better when they have to teach it or effectively communicate it to somebody else than if they merely have to spill it back to the professor on an exam. The students also feel good that what they develop is actively used, modified, and updated rather than just gathering dust on a shelf.

Linkages Among Courses

Burlington's Environmental Story (BES), compiled by students in the Senior Seminar in Environmental Studies class working individually or in small groups, provides the content background for projects in all the other courses. It is a comprehensive source about Burlington's natural environment (physical setting), its cultural history (social-economic-political-historical setting), and environmental issues/problems/concerns/challenges. It is a resource manual which celebrates Burlington's unique attributes or characteristics and establishes its "sense of place."

Supplementing the substantive information in BES are educational activities, compiled by students in the Environmental Education (EE) class, by which individuals can learn about themselves and their environment. The activities help Burlington citizens — especially youths — acquire the knowledge and develop the concepts and skills necessary for responsible citizen action; they nurture the sense of wonder and discovery in the local environment. These activities are for youths and adults in formal or nonformal educational settings and include such user groups as community organizations, school classes, interpretive centers, and the general public. Some of the activities are independent units, while others are supplements to science and/or social studies curricula in local schools. In most cases the units include activities derived from existing national environmental education curricula.

Students in the Environmental Interpretation (EI) class develop a variety of media (including short talks, self-guided trail, guided walks, illustrated talk or slide-tape program or videotape program) for a specific site in the Burlington area. Concepts for the EE activities are linked with themes for EI media (especially self-guided trails). Sites for EE field trips are linked with appropriate chapters in BES and with EI media (again, primarily self-guided trails). The self-guided trips provide interactive, self-guided field trips which make the substantive information in BES and the concepts for the EE activities come alive. Further, they promote individuals' visiting and learning from their entire local community, not just at sites for which self-guided trails have been developed.

Graduate students in the Citizen Participation in Natural Resources Planning (CP) class utilize the substantive information in BES as inventory data for revising and updating Burlington's Municipal Master Plan and for facilitating active citizen participation in the planning and growth management processes in Burlington, Chittenden County, and Vermont.

Results of the Linkages

Burlington has a rich and varied natural and cultural environment, as well as a unique set of environmental issues facing it. The projects for the four courses help to uncover and explain the natural and human influences that have made and will continue to mold the character of Burlington, and — in so doing — help give a sense of identity and individuality to what might otherwise be viewed as a homogenized community. This "sense of place" is important not only to local citizens, but also to tourists who visit the area (e.g., participants at the many summer conferences UVM sponsors, participants in the National Wildlife Federation's Green Mountain Conservation Summit, etc.).

In working on the projects, the students integrate existing public and private-sector groups engaged in EE programs. A simple matrix listing sites, themes, concepts, etc. pulls together previously scattered information on all these groups, and provides a starting point for more sophisticated computerized information access. The students' projects also provide creative ideas for enterprises in their formative stages (e.g., the proposed Waterfront Heritage Center: an interactive museum/educational center on the Lake Champlain Basin Bioregion's natural and cultural history to be located on the Burlington Waterfront; the proposed Wetlands Interpretive Center to be located at the Winoski Valley Park District's Ethan Allen Homestead).

What makes these four seemingly unrelated courses environmental is not their subject matter, but their procedures and the way they are experienced. They all incorporate the dynamics common to other environmental processes. And they can all be viewed as parts of a larger whole, a process of **environmentalizing** all social service systems through which people gain understanding of the environment; gain skills in recognizing and solving environmental problems and preventing their recurrence; and shape their attitudes and beliefs and values concerning the environment.

The **environmentalizing** process recognizes that the non-formal components of multi-age, life-long learning educational systems — including the family home environment, the church, the state, private-sector citizen organizations and interest groups, the working place, corporations, and the mass media — merit much attention, not just formal educational setting such as schools.

Future Prospects

In the future, the projects students have developed will be edited and made accessible to the general public, local schools, etc. via computer-linked interactive videotape (and, if funding becomes available, videodisc) programs. Those programs will provide information for the Burlington area such as is usually found for larger cities in separate books on 1) things to see and do with children, 2) places to take walks or bike rides or canoe trips or go cross country skiing, 3) natural areas and green spaces, and 4) architecture and historic buildings.

Already the students and I have begun to expand outward from Burlington and develop similar materials for Chittenden County, the Lake Champlain Basin Bioregion, and the State of Vermont.

Experiencing the Philosophies of Interpretive Naturalists From Thoreau to Leopold

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Abstract

This workshop is designed to introduce participants to the philosophies of some of America's greatest interpretive naturalists through a series of experiential activities. Participants will discover new ways to experience and teach environmental literature.

> "The morning wind forever blows, the poem of creation is uninterrupted; but few are the ears that hear it." — Henry David Thoreau

The philosophies of Henry David Thoreau, John Muir, and Aldo Leopold have had a profound impact on the contemporary environmental movement in America. Exposure to their writings, and the evolution of their environmental perspectives is essential for anyone seriously involved in environmental education. For it is through their minds and hearts that we gain a historical perspective of what we as a culture have lost in our physical environment, what we have gained in our consciousness, and the depth and complexity of the challenge to appreciate, understand, and protect the natural environment for future generations and all life that depends on it. John Muir spoke to this when he said:

> "The Universe would be incomplete without man, but it would be incomplete without the smallest transmicroscopic creature that dwells beyond conceitful eyes and knowledge. In wilderness this truth is readily apparent, and men can feel themselves part of wild nature - kin to everything. From such knowledge comes the respect for the rights of all the rest of creation." (Nash 1982)

This paper is designed to introduce the philosophies of some of America's greatest interpretive naturalists through a series of experiential activities that have been designed to complement the authors' writings. Through these experiences it is hoped that participants will gain a greater personal understanding and appreciation for the authors' philosophies that have provided us with the roots and evolution of our environmental consciousness.

Thoreau's Walden is one of America's first classic books focusing on nature. An outcome of the Transcendental movement, the book views wild nature as a place for humans to test and reevaluate their moral and spiritual development. "I went to the woods to live deliberately, to confront only the essential facts of life and see if I could not learn what it had to teach, and not, when I come to die, discover that I had not lived" (Thoreau 1960).

While some find Thoreau's writing to be burdensome, the profoundness of his observations and insights are as poignant today as they were during his life in reaction to the Puritan and Calvinist outlook. He was very critical of those around him, and despite the negative qualities of judging people, the questions he asked of his fellow humans are at least as important today as they were during his lifetime.

Activity for Henry David Thoreau.
Title: Thoreau and Contemporary Society.

Goal: To consider Thoreau's philosophies and their relevancies with respect to the contemporary human condition.

Objectives: Participants will:

1) Gain experience in applying Thoreau's views as they relate to contemporary human and environmental perspectives.

2) Discover the relevancy of Thoreau's views.

3) Gain a personal appreciation for the diversity of values people have depending on their background and the message Thoreau was attempting to communicate regarding the human condition.

Procedure: Select photographs from magazines of people representing diverse classes, cultures (including first and third world), and behavior. Tape the photographs on index cards. Give each participant a photograph and ask them to give their person a name and write a brief biographical sketch on the back of the card. Share the biographies with the group and ask the participants to also consider how their people would feel about a variety of environmental concerns such as: wilderness, famine, ozone depletion, etc. Finally, have the participants select one of the following quotes taken from Walden and explain how it relates to their individual.

Quotes taken from Walden:

"Our life is frittered away by detail." p. 66

"The value of a man is not in his skin, that we should touch him." p. 95

"I am convinced, that if all men were to live as simply as I then did, thieving and robbery would be unknown. These take place only in communities where some have yet more than is sufficient whiles others have not enough." p.119

"No human being, past the thoughtless age of boyhood, will wantonly murder any creature which holds its life by the same tenure that he does." p.144

"Though the youth at last grows indifferent, the laws of the universe are not indifferent, but are forever on the side of the most sensitive." p.148

"Most men, even in the comparatively free country, through mere ignorance and mistake, are so occupied with the facetious cares and superfluously coarse labors of life that its finer fruit cannot be plucked by them." p. 9

"The mass of men lead lives of quiet desperation." p. 10

"It is an interesting question how far men would retain their relative rank if they were divested of their clothes." p. 20

"The cost of a thing is the amount of what I will call life which is required to be exchanged for it." p. 25

"It is a mistake to suppose that, in a country where the usual evidence of civilization exist, the condition of a very large body of the inhabitants may not be degraded as that of savages." p. 28

John Muir embodies the spirit of all who are drawn and captivated by nature. His writings are less philosophical than Thoreau's, being more descriptive and based on his astute observations and feelings of exhilaration that drew him to wilderness throughout his long life. He beckoned people to "climb the mountains and get their good tidings. Nature's peace will flow into you as the sunshine into the trees. The winds will blow their freshness into you, and the storms their energy, while cares will drop off like autumn leaves." (Nash 1982)

Muir argued that some land should be preserved in its natural state as opposed to the popular idea of conserving the land for multiple use and sustained yield. His efforts to save Hetch Hetchy in Yosemite National Park in the early 1900's represents the first major environmental battle waged in this country. Muir was angered by the purely economic oriented capitalists who would eagerly dam a canyon it if meant cheaper water. Of them he wrote:

> "These temple destroyers, devotees of ravaging commercialism, seem to have a perfect contempt for nature, and instead of lifting their eyes to the God of the mountains, lift them to the Almighty Dollar." — Teale 1954

Activity for John Muir
Title: Meet a Tree

Goal: To gain an appreciation for trees and their vulnerability to humans.

Objectives: Participants will:

1) Become aware of the unique and special qualities of trees.

2) Gain an understanding of the deep feelings John Muir held for trees.

Procedure: Upon entering a forest community, gather the participants together and explain to them that they are going to be taken individually to meet a tree while being blindfolded. After spending several minutes with the tree, escort them to a central location, ask them to remove their blindfolds and see if they can find their trees. You may also ask them to stay with their trees for a while longer and write a story or poem about their tree and share these writings with the group. As a concluding and impactful ending, read the short essay by John Muir, "Any Fool Can Destroy a Tree." This essay can be found in The Wilderness World of John Muir, by Edwin Teale.

Forty years into the Twentieth Century, Aldo Leopold, author of A Sand County Almanac, and considered by many to be one of America's first ecologists, spoke of a land ethic. Leopold recognized the complex associations between plants and animals, and coined the idea of a land organism, implying that like an organism, the land is composed of living parts that are interconnected, and when one part, a forest or a river, for example, is sick or killed, a crippling effect is felt through the entire ecosystem.

Activity for Aldo Leopold
Title: Landscape/Land Ethic.

Goal: To develop a sensitivity for and understanding of a land ethic.

Objectives: Participants will:

1) Determine the diversity and complexity of a natural environment.

2) Discover the impact humans create when they "develop" a natural environment.

3) Gain an appreciation for Aldo Leopold's land ethic.

Procedure: Divide participants into two groups. Ask one group to draw a mural of a natural environment, preferably with local qualities. Ask the other group to secretly draw and cut out human "stuff" including buildings, cars, motorcycles, parking lots, etc. Allow 30 minutes for the assigned tasks. Tape the natural mural to the wall and then ask the second group to tape the human "stuff" on the mural. Discuss the reactions of each group as well as the impact made on the land. Finally, read and discuss Aldo Leopold's essay, the "Land Ethic," and relate it to the activity. I have taken excerpts from the essay and read it out loud as a means of emphasizing the need to develop a land ethic.

In conclusion, integrating these and other environmental education activities into the literature of Thoreau, Muir, and Leopold has encouraged stimulating class discussions, and I believe made the readings more relevant to my students. It has allowed us to better experience the philosophies and emotions that are so important in comprehending the depth and significance of our concern, appreciation, and responsibility towards the environment.

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Missouri's Aquatic Resources Education Program

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Abstract

The Missouri Department of Conservation is developing an aquatic resources education program for all Missourians. Missouri's program involves fishing and much more, presents vital conservation concepts and skills, and is integrated throughout the school curriculum.

The Missouri Department of Conservation's formal education program is based upon the premise that conservation encompasses knowledge, attitudes, behavior, philosophy and stewardship integrated into all subject areas of the curriculum at all grade levels. This formal education program is implemented through the education section of the Department and includes programs and services pertaining directly to fish, wildlife, and forest resources and indirectly to the state's other natural resources.

In 1939, the education program was established and a staff was hired by the Department. Today, that staff consists of seventeen Conservation Education Consultants (each serving several counties), plus curriculum specialists, secretarial, and administrative staff. The objective of the education section is to develop an environmentally literate, competent and dedicated citizenry which acts to prevent or resolve conflicts between people and the wise use of resources. The conservation education staff works with Missouri public, private, and parochial colleges and universities, school administrators, teachers, community leaders, youth leaders and the State Department of Elementary and Secondary Education to accomplish this objective.

Aquatic resources education in the state received a boost in the late 1980's with the creation of an Outdoor Skills Education Unit within the education section. Another important shot-in-the-arm resulted when additional funding for aquatics education was made available to the states through the 1985 Wallop-Breaux Act, which expanded the 1952 Dingell-Johnson Act. Revenue collected from a manufacturers' excise tax on sport fishing equipment and related items must be used for fisheries research, to purchase and develop public fishing accesses, to purchase and develop public fishing lakes, and to provide new educational programs. Missouri's Conservation Department's education section had several new aquatic resources education programs ready to propose once these federal funds became available. Due to space limitations, only three of the new aquatic resources education programs will be described within this paper: The Missouri Angler Program, the Urban Fishing Program, and the Mobile Ecology Graduate Teacher's Course.

Missouri Angler Program

Sixth graders never had it so good! Their school curriculum today includes studies most of us only day-dreamed about on warm spring days when we were in school.

The Missouri Department of Conservation is working with sixth grade teachers statewide in an effort to integrate conservation concepts and environmental understandings into their curricula. The Conservation Department has programs, materials, and services available free for the asking from pre-school through high school. But at the sixth grade level, an aquatic resources education program has really "caught" the imagination of some Missouri teachers and their students.

The local Conservation Education Consultant visits with several sixth grade teachers in the fall about getting involved in his department's Aquatic Resources Education Program. The teachers are enrolled in a one-credit-hour graduate teachers' course scheduled for March or April. The Conservation Education Consultant is the instructor. Teachers enrolled in the course are encouraged to put together a conservation teaching unit, with an emphasis on aquatics. This includes (but is not limited to) the study of water, aquatic life, aquatic ecology, water quality, ichthyology, fishing and related recreation, aquatic resources management, water safety, and outdoor ethics. Teachers not only gain knowledge about the above topics, but lessons and related activities for the classroom teaching unit are suggested.

The Missouri Angler Program, in a nutshell, works as follows: A sixth grade teacher enrolls in the program through the Conservation Education Consultant. The teacher agrees to enroll in the spring graduate credit course. A conservation teaching unit is written, with an emphasis on aquatic studies. Conservation Department personnel locate a suitable nearby pond with a landowner willing to let some enthusiastic sixth graders invade his pond site for a day. The Conservation Department stocks the pond with channel catfish and hybrid sunfish. As a culminating activity to the classroom teaching unit, the teacher and students take a field trip, or laboratory excursion, to the pond. There, several learning stations are set up to either reinforce the classroom lessons or introduce new lessons. Last, but not least, are program evaluations by students, teachers, and the Conservation Education Consultant.

Each student gets to spend part of the field trip time fishing. Rods and reels are provided—on loan—by the Conservation Department. Much of the funding for the equipment and the fish comes from the federal 1985 Wallop-Breaux Act.

This program makes learning fun. Motivation is not a problem. Kids learn best by doing. And this program lends itself well to an interdisciplinary approach plus addresses several core competencies and key skills identified by the State Department of Elementary and Secondary Education. If our natural resources are to be conserved for future generations, we must establish an informed and concerned citizenry. The Missouri Angler Program of the Missouri Department of Conservation attempts to do just that.

Missouri Urban Fishing Program

Fishing is popular both in Missouri and nationally. Approximately one million Missourians are anglers, with that number approaching fifty million nationally. About one of every five Missourians purchases a fishing permit. However, many people, for various reasons, do not have an opportunity to enjoy the exciting, but relaxing, sport of fishing. This is particularly true of Missourians living in our largest urban areas—St. Louis, Kansas City, and Springfield. The Missouri Department of Conservation is making an enjoyable fishing experience more accessible to thousands through its annual summer Urban Fishing Program.

Recognizing that fishing contributes significant social and economic benefits to an area and its citizens, the Department of Conservation began a cooperative program with local park boards in our three urban areas a few years back. This aquatic resources education program is administered by the local Conservation Education Consultant and a designated individual within the local Parks and Recreation Department.

The Conservation Department hires two knowledgeable local teachers in each of the three cities for the summer to serve as fishing instructors. A nearby pond is stocked regularly with channel catfish for the program. Bus transportation, rods and reels, fish bait, educational materials, free instruction, and portable restrooms are all provided for enrolled participants.

The St. Louis, Kansas City, and Springfield Parks and Recreation Departments work the urban fishing program into their summer schedule annually. The program is open to organized groups only—such as senior citizen groups, nursing homes, early childhood centers, substance abuse centers, girls' and boys' clubs, and children's homes. Recreational directors for such groups contact the designated individual within the participating cities' Parks and Recreation Departments in order to get enrolled.

The Urban Fishing Program runs for eight weeks each summer. It is a free educational program—no charge to those who participate. Groups may choose either a morning or afternoon session. This is a popular program, thus, each group is limited to one session per summer. Each angler is permitted to catch and keep four fish. Bus transportation to and from the pond is provided. Since the program is designated specifically for individuals who would not ordinarily have the opportunity to go fishing, one of two buses used is equipped to accommodate wheelchair-bound anglers.

The Conservation Department pond is closed to the public and is used only for this and other aquatic resources education programs. The experienced instructors at the pond site provide instruction on casting and angling techniques, safety, aquatic ecology, outdoor ethics, and care and preparation of the fish caught.

This writer believes that the reward of seeing an individual's interest grow in a healthy free-time activity is a gratifying experience. Youngsters become better stewards of the environment. Many participants find therapeutic value in the outdoor session. Senior citizens become young again. All those connected with this aquatic resources education program are definitely "hooked" on it.

Mobile Ecology Graduate Teacher's Course

Conservation Education Consultants have developed and instruct annually three mobile conservation/ecology courses for teachers in Missouri. Each carries four credit hours and is offered through a regional state university. The third such course, entitled "Water, Wetlands, and Wildlife" was made possible through Wallop-Breaux funding for aquatic resources education. Thirty-five teachers in this course travel for two weeks in a chartered bus, studying techniques and methods for conserving the state's aquatic resources. Resource speakers and activities focus upon everything from watershed management, historical uses of the waters of the state, current research, and fisheries management, to the structure and function of selected aquatic ecosystems. These mobile courses require considerable planning and preparation on the part of the Conservation Education Consultants involved, but have proven popular with teachers of the state, and are considered by all involved to be worthwhile learning experiences.

The above has provided only a brief sketch of just three facets of Missouri's Aquatic Resources Education Program (AREP). And the AREP is only one small part of Missouri's total conservation education effort. Missouri may be known as "The Show-Me State." This is not the case, however, when it comes to developing an "environmentally literate, competent and dedicated citizenry."

Teaching Farms and Environmental Education

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Abstract

Teaching farms integrate ecological principles and conservation methods into the lives of youth. Husbandry practices create laboratory opportunities. The session summarizes agricultural education history, examines factors promoting learning and provides curriculum development guidelines.

Agriculture as a Base for Environmental Education

Children and Civilization

Ask a class of 4th grade children, "Have you eaten plants for breakfast this morning?" and you will likely hear several "yaks," some resounding "no's," and a few reflective "yes's." For most children there is little association between their lives and soil, water and the husbandry of plants and animals. They are only secondarily acquainted with food as a supermarket commodity which has been processed, refined and packaged, further disguising any earthly roots. Yet, exploring food and farms captures children's interest and hitches the life of each child to the earth.

Agriculture raises fundamental ethical, social and environmental questions. Agricultural analyst, Lester Brown (1981), warns of today's deteriorating relationship between civilization and agriculture. "We have not inherited the Earth from our fathers, we are borrowing it from our children." The former assistant chief of the Soil Conservation Service, W. C. Lowdermilk puts this warning into the perspective of time. "The earth rewards richly the knowing and diligent, but punishes inexorably the ignorant and slothful. This partnership of land and farmer is the rock foundation of our complex social structure" (1953). Agriculturalists, historians and ecologists are reexamining the early civilizations in Mesopotamia and the Nile River Valley of Egypt, the Roman civilization in North Africa and the Mayan civilization in Central America. All of these once thriving cultural centers show mounting evidence that unsustainable agriculture practices were the primary factor leading to the disintegration of these civilizations. (Lowdermilk 1953, Marsh 1965). Exploring the complex of factors leading to agricultural disruption allows students to see the fragile complexity of habitat, community, resources and man.

Agriculture and Ecology

Traditional definitions of agriculture describe it as a "system of production of agricultural commodities including food, fiber, wood products, horticultural crops, and other plant and animal products." The term often includes processing, marketing, and distribution, health and nutrition, conservation of land and water resources, recreation resources, and related economic, sociological, pollution, environmental, and cultural characteristics of the food and fiber system (National Research Council 1988). While this definition certainly helps the public perceive all the multiple dimensions of agriculture as a commodity and process for feeding people, it does not promote ecological understanding nor develop issues of sustainability.

The earth has limits to the amount of energy and matter available to support life. It is essential to understand the general principles governing the cycling of matter and energy for these principles in turn govern food, human population and civilization. Man's ability to manipulate, extract, and subsidize at points of interchange in the earth's systems enables both beneficial productivity and environmental degradation (Hardin 1961). Today, man is a global farmer where any animal life and plant life useful to him is extracted and processed. World wide evidence of soil erosion, overgrazing, overfishing, and deforestation continues to mount, all pointing to deteriorating basic biological systems — systems which supply our food, fiber and industrial resources upon which our civilization is built. Ecologically minded people are defining agriculture in biophysical terms of sustainability, rather than in the more traditional concern for raising enough food to sustain the world's increasing population (Douglass 1984).

Agriculture has caused massive changes to the biosphere. Civilization requires that we do farm and that we do it intelligently! Maintaining fertility is the responsibility of the farmer. The physical and biological resources are the responsibility of the nation to conserve for our children's heritage and to safeguard the national welfare.

U.S. History of Agricultural Education

Vocational Agriculture

Why have environmental educators largely ignored agricultural education? Certainly part of the reason is the historic strength of purpose and tradition within this field. The United States government has provided a great deal of money and direction for agricultural education. The Morrill Act of 1862 set up land grant colleges, one purpose of which was the education of farmers. Since few farmers had time for college, the colleges became agricultural research centers, places to disseminate information and train teachers (Gerald 1962).

The Smith - Hughes Act of 1916 proved to be a turning point in agricultural education. Federal funds were allocated to states to assist programs with field experiences. Schools quickly switched to vocational agriculture and government funding. Agricultural success in the early 20th century fueled the industrial revolution. Generally speaking, as farming became more specialized, so too has course work in vocational agriculture. Federal funding in the 50's, 60's and 70's has kept it that way. Nearly all existing high school programs in agriculture today are organized for instruction in agricultural production (Stevens 1967). An assessment of agricultural education by a national panel of educators appointed by the Board of Agriculture of the National Research Council (1988) concluded that vocational agricultural education must change, adapt and be strengthened "to insure the skills and knowledge essential to the future vitality of American agriculture."

Agricultural Literacy

The National Research Council added a new dimension to national agricultural policy when it recommended that agricultural literacy be woven systematically into the educational curriculum. The committee "envisions that an agriculturally literate person's understanding of the food and fiber system would include its history and its current economic, social and environmental significance to all Americans" (1988).

Today, their is rapidly increasing public education interest in agricultural education. Whether the thrust of this education will be agricultural commodity education emphasizing the role of agriculture in providing food for the world, or whether education will utilize agriculture as subject matter for understanding ecology and for exploring science remains to be defined. Currently, programs such as "Ag in the Classroom" and "Farm and Food Bytes" are being promoted by U.S.D.A., Farm Bureau offices, and commodity organizations. National funding and support from industry promotional groups such as the National Pork Producers Council, the National Broiler Council, and United Egg Producers, is promoting curriculum and teacher training.

Proponents of an ecological science orientated school approach to agriculture are perhaps best represented by the Project Life Lab Program (1982), a model elementary school program integrating gardening and science. The program recently received a $2.1 million National Science Foundation grant for curriculum development with Addison-Wesley agreeing to co-develop, publish and market the product. The project is closely associated with the University of California Santa Cruz Agroecology Program.

At the University level, the 1980's began to see a trickle of government seed money for pilot programs in integrated pest management, sustainable agriculture and small farm research programs. Bill Liebhart, Director of the University of California Davis Sustainable Agriculture Research and Education Program observes that "The cutting edge in farming is at this agricultural - environmental boundary." It requires a systems approach to look at the complex interwoven factors rather than looking at only one or two variables. Reductionist solutions often unwittingly lead to the creation of other problems (1989).

Aldo Leopold (1949) described the challenge for environmental educators as our ability to stimulate citizen comprehension of ecological relationships and to extend their capacity for informed judgment and ethical action. The complex issues of agricultural sustainability challenge environmental educators to formulate lessons for student literacy to sustain our civilization.

Environmental Teaching Farms — Factors Promoting Learning

Farms have always held a warm place in the hearts of children and adults alike. Most of us are only one or two generations away from the farm. Many farms exist as part of a summer camp, petting zoo or living history environment. Animal care, showmanship and home arts are an integral part of county fairs across the nation. Only recently have farms emerged, which focus on science and environmental education.

In the Bay Area of Northern California there are seven farm sites which interact with 40,000 children each year. As director and developer for two of these sites, and consultant or observer of the others, I have delineated the following teaching farm characteristics as factors for environmental education success.

1) Farms tie urban lives to the world through food and fiber. Farm subject matter is intimate to the child. It is not a foreign habitat as is so often the case with "nature study."

2) Real life and death issues are tied to a youngster's lunch bag.

3) Agriculture is manipulation and change and thus lends itself to being an active, hands-on, manipulative, laboratory setting. In contrast, state parks, preserves and national forests discourage interactive learning.

4) Farms stimulate issues of conflict and interface between domestic and wild animals and plants, rural and urban, and producers and consumers. Farms raise questions of ethics and values.

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5) Husbandry is part of farming. Whether planting an apple tree or bottle feeding an orphan lamb, each requires care and nurturing.

6) Farms provide opportunities for observation and operation of small scale systems such as waste, water, energy and soils.

Curriculum Development Guidelines

1) Curricula should teach **through** agriculture, not **about** agriculture. Farming processes and techniques on how to be a better farmer is about vocational agriculture. Science and environmental literacy should be taught through the subject matter of agriculture and farming.

2) Adapt the production cycles and procedures of teaching farms to the educational process. For example, animal birthing and feed schedules should be tied to the school calendar.

3) Identify experiments and hands-on activities reinforcing key concepts. For example, collect livestock feces samples and examine under microscope for internal parasites, or weight lambs and calculate weight gain and feed conversion.

4) Correlate human beings into all aspects of the curriculum.

5) Keep the curriculum child centered rather than animal, plant or farm centered. Be sure that we are growing children, not farm or agricultural knowledge and products.

6) Use the word "science" and "education" in positive experiential contexts.

7) Curriculum should reflect examples of ethnic cultures and farming practices from around the world. Don't illustrate farming in solely European terms.

8) Use holidays, seasons and agricultural traditions to support curriculum and guide activities.

Summary

Environmental education and conservation ethics are about new attitudes and understanding of the land. Aldo Leopold (1949) wrote..."civilization is not...the enslavement of a stable and constant earth. It is a state of mutual and interdependent cooperation between human animals, other animals, plants, and soils, which may be interrupted at any moment by the failure of any of them." Teaching farms can hitch the lives of urban children to the earth. Environmental educators should turn further attention to teaching

farms, curriculum development and research on environmental literacy and agriculture.

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Energy Challenge Program

Nancy Kellog
Northglenn, Colorado

Abstract

One school district has a successful model for conservation of gas and electricity. Program success is based upon key components: joint project curriculum/instruction and maintenance, building energy team inservice, savings rebate and school recognition.

Enos Mills Nature Guiding

Robert and Enda Mills Kiley
Enos Mills Cabin, Longs Peak Rt.
Estes Park, Colorado

Abstract

Importance of his nature guiding concepts and why it is so effective today. Seven principles of Enos Mills nature guiding. Nature guiding and interpretation. "The outdoors bursts with entertainment, refreshment, surprise, and challenge." - Enos Mills

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Environmental Education and Outdoor Education Down Under

Clifford E. Knapp
Northern Illinois University
Oregon, Illinois

Abstract

A slide show of environmental and outdoor education programs in Australia emphasizes new techniques and programs from Australia's environmental centers and communities. The training of teachers and interpreters will be discussed. The presentation allows time for participants to ask questions and make comments after the slide show.

How to Implement a Multi-Faceted Education Program Without Using a Lot of Your Own Money

Ms. Kimberley M. Knox, Water Conservation Technician
City of Aurora-Utilities Department
Aurora, Colorado

Abstract

This seminar will go over the step-by-step process of identifying programs that can be funded by private corporation, identifying what companies to contact, and ways to insure funding for next year's programs. This will be a fun and informative workshop for all.

Oakland Museum Public Education Project

Kathy Kramer
Aquatic Habitat Institute, Alisya Galo, Oakland Museum
Richmond California

Abstract

Using a Macintosh computer, a large screen monitor, and the software package ***Business Filevision,*** *this interactive, user-friendly display provides information about the ecology of the Bay-Delta, and the impacts of man's activities on the estuarine ecosystem. This information is displayed on base maps that are enhanced with the addition of graphic and text screens that pop-up at the visitor's request.*

The Aquatic Habitat Institute, in conjunction with the Oakland Museum, has developed a portable, computer-based public education display on the San Francisco Bay and Delta. Using a Macintosh computer, a large screen monitor, and the software package **Business Filevision,** this interactive, user-friendly display provides information about the ecology of the Bay-Delta, and the impacts of man's activities on the estuarine ecosystem. This information is displayed on base maps that are enhanced with the addition of text screens and graphics that pop-up at the visitor's request. To obtain details on specific areas of interest, the visitor simply points the on-screen arrow and clicks a button located in the display panel.

Information contained within this display is divided into three major subjects: **Using the Bay, Life on the Bay,** and **Bay-Delta Issues. Using the Bay** contains specific information on industrial and municipal dischargers, salt production, shipping, and location of fishing "holes," and bayshore parks and refuges. **Life on the Bay** contains information on Bay-Delta hydrology, geology, biota, and habitats. **Bay-Delta Issues** presents information complex management questions concerning water diversion, dredging, contaminant loading, and bay fill. The display will be located in the Natural History Hall of the Oakland Museum, and is due to be placed on the floor this summer.

This public education project is based on a similar display created by the National Oceanic and Atmospheric Administration's (NOAA's) Santa

Barbara Channel Islands Marine Sanctuary. The computer exhibit is so popular with visitors that NOAA is presently creating a similar display for the Gulf of the Farallones Marine Sanctuary in northern California.

Data and Information Management System (DIMS)

Kathy Kramer
Aquatic Habitat Institute, Alisya Galo, Oakland Museum
Richmond, California

Abstract

This menu-driven, user-friendly, keyword searchable data management system for the San Francisco Estuary contains detailed summaries of research programs, and also a Bay-Delta bibliography. Designed to be useful in enhancing coordination and communication between the scientific community, environmental managers, and the public, data access is available to any interested party at no charge at (415) 643-7485.

The Aquatic Habitat Institute, funded by the EPA's San Francisco Estuary Project, has developed two databases as part of the Data and Information Management System (DIMS). The first database, known as the Estuarine Data Index, contains detailed summaries of 70 research and monitoring programs that have been, or are presently being, conducted in the San Francisco Estuary. Each summary contains an abstract, and information about methods, and quality assurance procedures. The summaries also list sampling site locations, parameters studied, references, and contain information on data storage, including contact names and telephone numbers. Each summary was verified by the principal investigator. This database was designed to be useful in enhancing coordination and communication between the scientific community, environmental managers, and the public.

The second database is the Bay-Delta Hearing Testimony and Exhibits database. The California State Water Resources Control Board is presently conducting evidentiary hearings to set water quality standards for the San Francisco Estuary, and to consider amending water rights to implement these standards. This complex task began in 1987 with the receipt of tremendous quantities of written and oral evidence regarding the beneficial uses of the Estuary, factors that affect those uses, and means of implementing water quality objectives. The Hearing Testimony and Exhibits Database contains verbatim transcripts of the oral testimony given during Phase 1 of the Bay-Delta Hearings; it also contains a list of the exhibits submitted during the hearings.

A third database, due to come on-line this summer, is the San Francisco Bay-Delta bibliography. The more than four thousand entries in the database can be searched by author, title, or subject. Compiled from in-house publication organizations, this menu-driven, user-friendly database will be a welcome addition to the DIMS.

Both the Estuarine Data Index and the Testimony and Exhibits database are menu-driven, keyword searchable, and are available to any interested party at no charge at (415) 643-7485 (modem number). Communications software with VT-100 emulation capability is needed to log onto the system. Log-on instructions and public domain communications software is available from the Aquatic Habitat Institute at (415) 231-9539.

Teachers in the Environment

Dr. Marylin Lisowski
Eastern Illinois University, Dept. of Education
Charleston, Illinois

Abstract

To prepare teachers to confidently and competently teach about, for, and in the environment, a special summer institute, Project FIELD, was developed. The model, methods, and materials of two years of FIELD will be shared.

Groundwater Protection: Surfacing the Buried Treasure

Dr. Marylin Lisowski
Eastern Illinois University, Dept. of Education
Charleston, Illinois

Abstract

Groundwater is an extremely valuable resource that is slowly being recognized in education. An activity manual was collaboratively developed to address groundwater protection in Illinois. The process and product of this joint effort will be shared.

The impending perils associated with toxic waste disposal, hazardous chemicals, and groundwater contamination often are highlighted in the popular press and through the media. This coverage has been of critical importance since the very nature of groundwater harbors the danger that the "out of sight, out of mind" mentality may prevail. Currently, initial efforts are underway in policy formation and educational programming for groundwater protection. In September 1987, Illinois became the second state to enact groundwater legislation. The Illinois Groundwater Protection Act's (P.A 85-0863) intent is to focus on the need to manage groundwater quality through a prevention - oriented process. Education is one vital component in this process.

In order to address the educational dimension of the Illinois Groundwater Protection Act, representatives from various state agencies and educators from the Environmental Education Association of Illinois (EEAI) worked collaboratively to develop an activity guide entitled, Groundwater: Illinois' Buried Treasure. This joint project of the Illinois Department of Energy and Natural Resources and the EEAI was coordinated through the Museum of the Chicago Academy of Sciences, which is the United States second oldest scientific institution. The activity guide is comprised of ten activities that are appropriate for use with students in grades two through twelve. The activities were field tested statewide by twenty-six teachers. A conceptual scheme formed the basis for the selection of the activities and is presented in the guide. A variety of instructional strategies are employed in the various activities. Experimental investigations are used in the activity, "Porosity and Permeability," gaming is utilized in "Water Monopoly," models are constructed in "Big City Blues" and field explorations occur in "Hazardous Homework." Each activity is correlated with Illinois State Goals and Knowledge/Skills for Learning in the Sciences. Evaluation items and options are included for each activity. The manual also contains appendices which provide information, diagrams, data, and graphics in various aspects of groundwater. In addition, a list of resources are identified that offer a variety of brochures, booklets, posters, educational kits, and audio-visuals on groundwater topics. Other listed resources include summaries of related curricular programs and samples of teaching aids.

Hopefully through education, today's youth will be guided to recognize the importance and vulnerability of groundwater and will then be led to act responsibly in caring for and protecting the valuable resource.

Public Education Using Computerized Water Resource Management Simulation

Dr. Ted Mills and DouGlas Palenshus
Oklahoma State University
Stillwater, Oklahoma

Abstract

This workshop provides general-level hydrologic information and gives workshop participants a "hands-on" opportunity to develop and

evaluate water management strategies through the use of a Water Resources Management Simulator.

The next glass of water that you drink will contain some of the same water that was in the Red Sea when Moses, according to biblical tradition, parted the waters and led his people to freedom. This mathematical oddity is the result of the tremendous number and extremely small size of water molecules and points to the general acceptance of water as being a renewable resource.

Early man judged the quality of water with his senses. Unpleasant sights and odors might deter the use of ground or surface water as a source. The consumer received untreated or raw water. The natural processes of water purification has in the distant past taken care of man's needs, but since 1850, the world's population has almost tripled. Commerce and industry have likewise expanded creating substantial increases in per capita use of water. People are using water faster than natural processes can refine it. A single person can exist on a gallon or so of water a day for drinking, cooking and washing. In Medieval times a person probably used no more than three to five gallons per day. In the nineteenth century, particularly in Western nations, they were using 95 gallons per day. At present in the United States, we use about 1,500 gallons per capita/day for our needs and comforts such as recreation, cooling, food production, and industry.

Obtaining the desired quantity and quality of water is no easy task. Our water supply comes to us in the form of precipitation and currently man can do little to systematically alter the earth's complex water cycle (Ok. St. Dept. of Ed. 1977). Effective management of this limited and often variable resource is further hampered by lack of public understanding. To increase this understanding, a number of professional organizations are addressing the problem of how, when, what, and whom to teach about water. One possible means of water resource information dissemination under consideration is the application of computer simulation technology.

However, a current drawback of computer simulation is that participation is limited to one or a few persons at any one time. The critical ingredient of group interaction is missing. Group interaction in clarifying problems, considering alternatives and trade-offs, and in making decisions, as well as in the cooperative action so necessary to environmental problem solving, is slighted. A multi-user interactive computer simulation (MICS) solves this problem.

It does this by providing input from a number of participants at one time, and by summarizing interactions and sharing results simultaneously with all participants. In addition to simultaneous group interaction, a 'MICS' models situations where relevant environmental concepts and issues are considered objectively in the absence of excessive emotional bias common to local site-specific water issues. Emotional involvement is present but not to the degree that it interferes with consideration of rational alternatives! (Mills 1983).

The use of computer simulation for modeling complex environmental problems has great potential. It is uniquely suited to environmental education because it can: a) speed up or slow down time, b) employ expensive or unavailable materials and procedures, c) act to objectively select random phenomena, d) provide active participation and input by the learner, e) provide immediate feedback, f) reduce complex problems to manageable size, g) create problem situations where processes and concepts from many disciplines are interrelated in the search for solutions, and h) allow exploration of alternatives without having to live with harmful consequences (Noonan 1981; Blosser 1982).

The Water Resources Management Simulator (WRMS), a multiuser interactive computer, models a region's water supply and demand situation. The main simulator panel, (Figure 1), includes displays for stream flow above and below the water use area. Water quality (silt and total dissolved solids) is indicated by green, amber, and red lamps. A red lamp shows if the stream flow falls below the level that the group reserves for downstream users. The sub-basin display shows the ground and surface water reserves and the relative demands by group. Lighted bar graphs indicate the ratio of ground to surface water used and the ratio of water consumed to water returned to the stream. A clock in the upper right-hand corner indicates time in months and years.

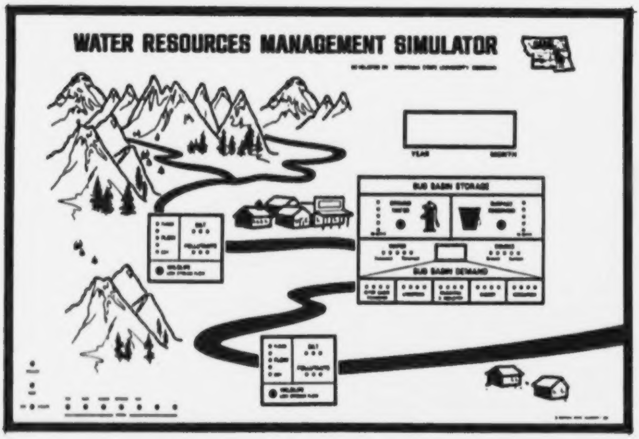

Figure 1. Main Simulator Panel

Input into the main panel is made by workshop participants using several small sub-basin control consoles (Figure 2). Decisions regarding storage of surface and groundwater, rate of water use, sources of water, water use technology, and wastewater are made with controls on these consoles. Four water use categories are provided in the model: 1) irrigation, 2) livestock, 3) municipal and industrial, and 4) energy production.

For each use the water may be drawn from either the ground or surface source. An additional console adds a functioning reservoir to the river basin. Separate lighted bar graphs on the main simulator panel (Figure 1) show available water in the aquifer and reservoir. The group conducting the simulation may interact with the model at any time, changing variables to optimize their situation. These changes in data remain in the computer memory within the simulator and can be automatically presented with a televised color graphics display.

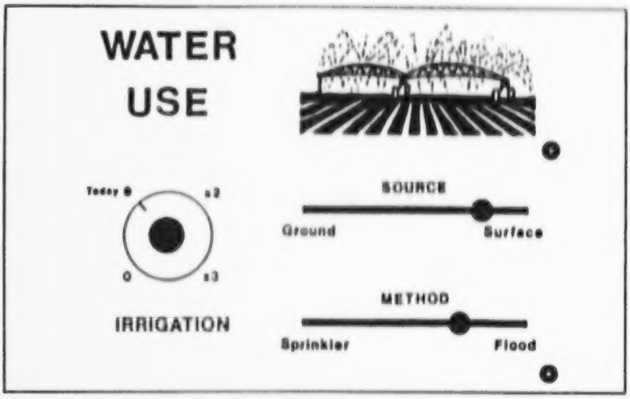

Figure 2. Control console.

Following a simulation, one can reconstruct the conditions and strategies used during the session by calling back the data from memory. This data can then be manually plotted using graph paper or reviewed on the television monitor. After observing the results of a simulation, participants can discuss the strong and weak points of their water management policy, modify their strategy, and press the reset button for another try.

The simulator is a tool which allows groups of people to experience decision-making situations involving real variables and alternatives. It can also project for them the probable consequences of their water management strategies. (Mills, Amend, Sebert 1985). Research has shown that using the WRMS is effective for a) water information dissemination, especially at the senior high school and adult levels, and b) increasing concern for water issues, particularly with high-school students of ages from 16 to 18 (Mills 1983). Currently the WRMS is being used as part of a program to retrain petro-geologists so that they may assume employment as hydrologists. Over one hundred petro-geologists working with the simulator have indicated through formal and informal feedback that their experience with the simulator has been successful in helping them understand the interaction of factors in the hydrologic system. This diverse application makes the WRMS a valuable vehicle for water resource management education.

The application of the Water Resource Management Simulator as a public education tool has great potential. Because experience with the simulator results in increased knowledge and concern for water issues prior to actual confrontation with those issues, it is a valuable asset in the public education arena. School districts, state and federal agencies, as well as universities should consider programs to make the WRMS available to a large segment of the general population (Mills 1983).

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Live-In and Learn: Focused Environmental/Outdoor Education

Leonard Nelson, Principal
OELS-Windy Peak
Bailey, Colroado
and

James R. Jackson, Principal
OELS-Mt. Evans
Evergreen, Colorado
and
Janice J. Withington, Resource Specialist
Outdoor Education Department
Golden, Colorado

Abstract

An in-depth look at how a residential (live-in) curriculum based program provides five days of hands-on, immersion experiences detailing our relationship to natural and human environments; the focus is on awareness and the development of environmental ethics.

Maine School Science and Natural History Enrichment Project

Maureen Oates and Carey Hotaling
Maine Audubon Society
Falmouth, Maine

Abstract

This session focuses on teacher leadership with their peers in developing environmental education programs in school districts. Aspects covered include leadership training for teachers, involving administrators, working with volunteers, motivating and supporting beginner's participation.

The Role of Environmental Education in Pre-service Teacher Training

David Pence, Doctoral Student/Teacher Educator
PROBE Program, University of Colorado at Boulder
Boulder, Colorado

Abstract

This presentation will involve a discussion of the role that environmental education can and does play in teacher education programs in the United States.

Educating About Wolves

Mark R. Peterson, Director
Sigurd Olson Environmental Institute, Northland College
Ashland, Wisconsin

Abstract

Wolf recovery plans are an issue in several states. Often controversy stems from public misinformation or wolf stereotypes that distort the true picture. Learn about the wolf films, video tapes, and written materials available that convey accurate, unbiased, and oftentimes, entertaining information and how one state has formed a network for educating about wolves.

The wolf: this creature has always conjured up strong images in people's minds—admiration and a majestic symbol of the wilderness in some, fear and hatred in others. The wolf's story is inexorably bound to human attitudes—often shaped by folklore and prejudice. Its fate may well rest upon educators' abilities to better inform society about this almost mythical predator and what our co-existence with the wolf means for farmers, sportsmen, loggers, and visitors to areas where wolves live.

Wolves once roamed nearly all of North America from Alaska's high tundra to Mexico's central deserts (Mech, 1970). While some 6,000 wolves persist in Alaska down from 10,000 a decade ago (Williams, 1988), all other U.S. populations are officially "threatened"—in the case of Minnesota's 1,200 wolves—or "endangered" as are the roughly two dozen in northern Wisconsin, one dozen on Isle Royale in Lake Superior, and a few scattered populations in the northern Rockies and in North Carolina (Teton Science School, 1987).

Early European settlers brought with them a fear and hatred of wolves. In New England, the wolf was exterminated by the early 1800's. As settlers pushed west, they continued to kill wolves and other predators. On the Great Plains, buffalo hunters turned to wolf hunting after they hunted the great herds of buffalo into oblivion. Cattle and sheep ranchers in the West trapped them, poisoned them, shot them and burned their pups alive in their dens. In 1905 we even tried boilogical warfare, infecting them with mange. Many states offered bounties on wolves and the federal government killed wolves as part of predator control programs on public lands. Even people who would later become famous conservationists were swept up in the anti-predator movement. Aldo Leopold wrote of killing wolves in the Southwest to improve conditions for deer and some of northwoods naturalist Sigurd Olson's early writings reflect negative attitudes toward wolves also (Leopold, 1989). By the 1950's humans had nearly exterminated wolves from the lower 48 United States. Conservationists believe that misperceptions and negative attitudes towards wolves are the major impediments to wolf recovery. Surveys of human attitudes about wolves in Minnesota, Wisconsin, and Michigan indicate strong support for wolf recovery among some segments of the public, but fear and hatred among others (Link, 1988). These attitudes are shaped in part by many misunderstandings about wolf behavior.

The wolf is a creature shrouded in mystery and myth. Since earliest human cultures, there has been a relationship between wolves and humans. Wolves continue to play a role in the language, folklore, and customs of present societies.

The white man's fear and loathing of the wolf dates to medieval Europe when the Roman Church exploited the creature's reputation to create a devil. During the Inquisition the church kept the populace in hand by identifying and executing humans who resembled wolves. Wolves prowl our literature, exploiting the young and innocent, sometimes with vile sexual undertones. Wolves are often given bad human traits—gluttony, deceit, lechery and cowardice (Lopez, 1978).

In 1989, the Wisconsin Department of Natural Resources completed its timber wolf recovery plan. The plan's goal is to increase the state's wolf population from the current number of about 20 wolves, to 80 wolves by 1998 (Wisconsin DNR, 1989).

The plan notes that its success depends on public education. People are the critical factor limiting the wolf's return to Wisconsin. Nearly half of all the wolves in Wisconsin die each year, more than half killed by people. The restoration of the wolf population requires that such killings, both accidental and intentional, be reduced.

In response to the plan, the Sigurd Olson Environmental Institute of Northland College established the Timber Wolf Alliance. From its northern Wisconsin base in Ashland, the Institute has developed a network of 27 sportsman, environmental and Native American organizations interested in working together to bring accurate information about wolves to the public in Wisconsin and Upper Michigan.

One representative from each organization serves on TWA's steering committee which initiates projects, seeks funding and guides the activities of a statewide network of 40 volunteer educators. These volunteers meet TWA's three main objectives: 1) Develop and acquire unbiased educational material about wolves; 2) Provide a repository for these materials; and, 3)

Train volunteers to present and distribute the information to schools and groups through audiovisual programming.

TWA is now in the process of developing an audio-visual library of wolf programs that have been screened for accuracy. This service will make it easy for educators to go to one source for a variety of materials which are now often difficult to find.

Where materials don't exist, TWA is developing programs to meet these educational needs. For example, the Alliance is now finishing a slide/tape program which specifically focuses on the wolf situation in Wisconisin and Upper Michigan and addresses misconceptions as identified by attitude surveys.

The key to preserving the wolf - whether in Yellowstone National Park or the northern forests of Wisconsin - lies in providing people with a better understanding of its place in the world. Factual information is needed that presents the wolf neither as a beast of death and desolation nor as a noble demigod incapable of impacting human enterprises. With this understanding, wolves can once again become part of America's wild heritage.

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Using Videotapes for In-Service Teacher Training in Environmental Education

Dr. Gerri A. Pomerantz
Department of Natural Resources
Ithaca, New York

Abstract

The Wildlife Ecology Support Supplement (an educational program of the New York State Department of Environmental Conservation) is a series of videotaped instructional materials designed to help elementary school teachers educate children about basic ecological principles and resource management concerns. This presentation will provide an overview of the program's educational objectives, the rationale for using video as a teaching training tool, and the problems and advantages of creating training videotapes. Segments of two videos will be shown and the results of the first phase of the program evaluation will be presented.

Voyage of the Mimi

Bernajean Porter
Colorado Department of Education
Denver, Colorado

Abstract

Multi-media interdisciplinary curriculum for middle schools. Video, computer software and print materials create a dynamic learning environment using the subject of whales. Students learn math, science, social studies, language arts, and other content areas while pursuing the scientific and environmental issues surrounding whales.

Primitive Skills

Barbara Poulin
Steamboat Springs, Colorado

Abstract

This class will be hands-on experiential learning. The participants will make cordage and experiment with flint knapping. Other primitive skills will be discussed and demonstrated.

Political Ecology: Integrating Technology Studies into Environmental Education

Thomas B. Rainey, Director
Graduate Program in Environmental Studies
Evergreen State College
Olympia, Washington

Abstract

Science, Technology, and Society has recently emerged as a theme of importance for environmental education. The National Association of Science, Technology, and Society is urging all educators involved with scientific subjects to incorporate this concern. In 1988, the NAEE devoted a symposium to how environmental education could incorporate an examination of the social relations of science and technology into our materials.

The Evergreen State College offers master's degree work in environmental studies. One of the approaches we have been developing is what we call Political Ecology. This approach focuses on the ways in which societies do and should organize themselves in order to use resources from the biosphere for production, distribution, and consumption. We incorporate the concept that technology is specialized knowledge that enables people to use natural resources to satisfy their material needs and wants. In turn, we argue that understanding the creation and use of technology involves the exercise of political power for economic purposes. Political Ecology also involves close examination of the epistemological, historical, and ethical foundations of ecology and economics as areas of study.

This panel will present an overview of the Political Ecological theory that we have been developing. Three faculty members (from History, Biology/History of Science, and Political Economy) will present their views of the Political Ecological concept. Three students, who are also trained as secondary school teachers, will then present how they use the Political Ecological concept in their own work.

Geopiety: Earth as Teacher

Clayton T. Russell
Rockford, Illinois

Abstract

This presentation will explore how Native American peoples have long been aware of the sacred power of the Earth. Their stories, teachings, language, and ceremonies re-emphasize, in their daily life, a "bonding" with the landscape.

Learning By Design

Alan Sandler
American Institute of Architects
Washington, DC

Abstract

A hands-on exploration of how we learn, perceive, and make decisions about the built environment. The session participants will discover their teaching/learning styles, explore the design process as a decision-making tool, and experience the process of locating local resources for classroom use. The presentation includes group discussions, video and slide presentations, hands-on experiences, and options for self-discovery and personal use of materials.

Learning by Design -- The Environmental Education Program of The American Institute of Architects

Architecture and Education

Architecture is only one of the many forces affecting the environment, but it is one of the most important. Today's architects are concerned with education because they are concerned with achieving and preserving quality in the environment. For this to happen on a meaningful scale in the United States, there must be a widespread public expectation and demand for quality in the environment.

Aware citizens can make better choices. They require buildings designed to a human scale, streets designed for safety, furniture designed to fit the human body, classrooms designed for learning, parks designed for rest and recreation, and public buildings designed to express the values of the community.

This human-designed environment is the architect's particular domain. What is built, why it is built, and where it is built are all a part of the profession's responsibility. The architect, in collaboration with the client, strives to achieve an architecture of consequence. Architecture has a personal and often dramatic effect on everyone. We live, work, study, and play in our buildings. Our surroundings affect our moods and temperaments; certain buildings, parks, plazas, and streets lift our spirits, while others diminish them.

The architect relies on the public's participation and interest in the design process, for it is that interest that stimulates the architect to achieve work of significance. The public should be an educated participant. If we are to influence our architecture—and its lasting effects—we must embark on a strong and pervasive education effort.

The American Institute of Architects

The American Institute of Architects (AIA) is the national organization of the architectural profession, established in 1857. Membership in the AIA is open to every architect licensed to practice in the United States and currently includes over 50,000 licensed architects in almost 300 local components. The Institute's national office is in Washington, D.C.

The AIA's mission is to maintain the standards and competence of architects. The following statement from its By-laws gives clear expression of the ideals of the profession:

> "The objects of The American Institute of Architects shall be to organize and unite in fellowship the architects of the United States of America; to combine their efforts so as to promote the esthetic, scientific, and practical efficiency of the profession and building industry by advancing the standards of architectural education, training, and practice; to coordinate the building industry and the profession of architecture to insure the advancement of the living standards of our own people through their improved environment; and to make the profession of ever-increasing service to society."

The AIA and Environmental Education

Since 1966, the AIA has been involved in elementary and secondary education, working on the national level to help clarify issues and develop methods and materials to raise the public consciousness. The AIA has been instrumental in providing the general public—and especially school-age children who will become decision makers as adults—with a better understanding of the factors that influence the nature of its physical surroundings. Our objective has been the education of a thoughtful citizenry, equipped with skills and values, taking reasoned action necessary to shape cities, towns, and countrysides into better places to live, and remaining active in efforts to ensure that these will continue to be better places in the future. That is why architects, both individually and collectively, have supported environmental education and increasingly have become activists in elementary and secondary education programs. Participants have assumed many roles: legislative activists, theorists, consultants, architect/educators, community workshop organizers, and civic speakers. The AIA's primary objective has not been altered: "To create an awareness of and concern for the human-designed environment as it relates to the total environment among all education sectors, pre-kindergarten through adult education."

In this role of education catalyst, the AIA has developed several resources and services. Informational materials for teachers introduced the need for integrating human-designed environmental concerns into the classroom. Information bibliographies were developed, with the first in 1970. Active support of effective legislation at both the federal and state levels has been pursued.

In 1980, the AIA conducted a national survey to determine the needs of the education community. Over 900 persons were contacted throughout the country, including state environmental education coordinators, primary and secondary school teachers, education administrators, graduate faculty of architecture and education, textbook publishers, representatives of nonformal education sectors—including television, children's magazines, and museums—AIA components and AIA Environmental Education Committee members.

The most significant findings of the survey indicated the critical need for access to high-quality education resource material, particularly instructional and activity guides, and for training that would enable educators to integrate human-designed education into existing curricula.

The Learning by Design Program

Based on these findings, the AIA embarked on an intensive period of planning which included consultation with professionals from the formal and nonformal education sectors. What emerged from these discussions was the structure for a system of interrelated material resources, the mechanisms for delivering these components, and, perhaps most important of all, a conceptual framework—the basic notions upon which the program would rest. The program is entitled Learning by Design and surpasses all previous AIA elementary and secondary environmental education activities, both in scope and in substance. The ultimate goal is for every student to develop the ability to live in harmony with the natural environment and the skills to appreciate, evaluate, and contribute to the design of a quality human environment.

Learning by Design, the environmental education program of The American Institute of Architects, is a comprehensive approach to education for a quality environment. It is a system of resources designed to enable educators to develop an enhanced perception of their surroundings and translate this into practical activities for their students.

Learning by Design has five key elements.

The Conceptual Framework

The articulation of the concepts and ideas that constitute the knowledge base is basic to the program. This framework integrates the human-designed and natural dimensions of the environment and synthesizes the dynamics of environmental systems with those of human perception, values, and behavior. The concepts are offered neither as a mandate nor as a new course of study, but rather as an approach for blending environmental principles into existing instructional programs.

Information Resources

In order to address the needs of educators for information about existing materials, The Sourcebook II was developed and disseminated. This publication is a compendium of information about existing programs, currently available teaching materials and persons and organizations that are vitally involved in environmental education activities. It is the centerpiece of the information aspect of this program.

Workshop Program

The workshop program, conceived as a partnership between school representatives and architects, explores ways to make the human-designed environment accessible to students. This program features active collaboration between architects and educators in the development of new learning strategies and activities for classroom use. Curriculum development workshops have been conducted for education agencies, and numerous presentations and symposia have been held across the country.

Action Program

This program develops and disseminates activities for use by teachers and architects in the classroom. Examples of action program materials include a teaching poster, "Architecture: A Design for Life," an art education unit, "Architivities: Projects for Understanding Architecture," and a science unit, "Why Do Buildings Stand Up?" These have been developed with and inserted in major education magazines. The Action Program has also developed public television programming for children with accompanying supplemental teaching materials.

Technical Assistance Network

Each of the 19 AIA regions has a coordinator for Learning by Design. This network disseminates information about the program to local architects and educators and seeks to gather information about successful programs on the local, state, and regional levels and to furnish the AIA with advice and opportunities for strengthening architects' interaction with the education community.

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An Interdisciplinary Science Festival for Elementary School Students

Steven D. Schultz
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Grand Junction, Colorado

Abstract

Trends and issues in elementary education reform dictate a need for training scientifically literate students who are cognizant of the relationship between science, technology and their effect on society. Scientifically literate students must be equipped to make informed decisions especially with reference to current environmental concerns. To accomplish this, commitment to ongoing teacher training is critical. Experiences must be developed for students that are age appropriate and related to science process skills. This paper describes a program that attempts to meet that challenge.

The current movement of reform in elementary education is affecting all areas of the curriculum. Science is no exception. The National Science Teacher's Association suggests that "science should be an integral part of the elementary school program." (NSTA 1982).

Indeed the push is for development of scientifically literate students. Such literacy involves much more than reading about science topics during a prescribed science period. Scientifically literate students: are familiar with the natural world; are able to understand key concepts; are aware of ways that science, mathematics and technology depend on each other; are aware of limitations and strengths in science and technology; have a capacity for scientific thinking; and are able to use that thinking in coming to understand individual and social issues (AAAS 1989).

In short, recommended changes in science education should require students to study the interactions among science, technology and society in the context of science related societal issues (NSTA 1982). Effects of pollution, ozone depletion and other environmental concerns are good examples. Furthermore, this suggested study should be integrated and included in all subject areas and grade levels. Activities should be as concrete and direct as possible (Engleson 1986). Any successful reform must be a collaborative effort between administrators, community businesses, labor leaders as well as teachers, parents and students (AAAS 1989).

This paper describes an interdisciplinary program aimed at helping elementary school students build meaningful bridges between the prescribed science curriculum and the "real world." It also provides opportunities for staff development and community involvement as well.

Preliminary Activities

The program, which has been developing at Columbus Elementary School in Grand Junction, Colorado for the last three years consists of a series of preliminary activities that lead up to a day-long culminating Festival. Throughout the process, students, teachers, and parent volunteers are given the opportunity to learn and practice science process skills in developmentally appropriate activities. In one approach, students are allowed to participate in a Science Club, Invention Club, Knowledge Bowl Club or Adventure Club. Students meet with the club of their choice every Friday for a minimum of one hour during the school day. Each club incorporates the development of science process skills from a different angle.

The Science Club is reserved for intermediate students. It takes students step by step through the development of a Science Fair project. A timeline is established and each week students can receive guidance and direction from the teacher sponsors. "Teachers need to demonstrate how the scientific method works before children can be expected to use it on their own." (Tingle 1987) Project ideas stem from topics covered in the science and/or social studies curriculum appropriate to their grade level. This enhances application opportunities. Teachers, then, support the successful completion of the project in an effort to insure student success. Finished projects are displayed at the Festival.

The Invention Club is open to first through fifth grades. It leads students through the process of creative invention. Initially cooperative group activities help students practice visual thinking and inventive thinking as described by McCormack (1981). At the end of the twelve weeks, students have completed inventions of their own that are displayed at the Festival. Again, the continual support of the teachers insures success for students of any ability.

The Outdoor Adventure Club is open to any student. It emphasizes environmental issues. Age appropriate interdisciplinary activities from Project Wild and Audubon Adventures are used in this club. Any projects completed are saved for display on the day of the Festival.

The Knowledge Bowl Club organizes teams of four students each to compete in school-wide Knowledge Bowl Competitions. Students learn about different levels of questions. With teacher support, questions are developed by students. Then teams train for the Knowledge Bowl Finals which are held the week of the Festival. In addition to the weekly club activities, interdisciplinary science activities can be shared by staff members on a regular basis during staff meetings. This encourages constructive use of activities in the regular classroom.

Culminating Activity

This component of the program provides for involvement of local experts from science related professions. These experts are invited to give presentations that actively involve students in activities and demonstrations related to their field of expertise.

Several months before the Festival, a committee of teachers and parent volunteers brainstorm possible topics related to the curriculum that might be addressed by the local professional community. Presenters are then recruited. This important planning step is designed to help facilitate and ensure that students experience first-hand how the science process skills they've been practicing in clubs are used by professionals in real life situations.

During the day-long activity, students are divided into groups of ten to fifteen. Each group attends five to six forty-five minute sessions that represent a variety of science, technology and society disciplines. Care is taken to schedule students into developmentally age appropriate activities.

A very important component of the Festival Day is the Room of Exploration. This is an activity center set up in a large multi-purpose room. The area is divided into twenty to twenty-five booths each featuring a different hands-on learning experience. The activities provide yet another opportunity for students to apply the skills practiced in the preliminary activities in a different context. They allow students to build, experiment and observe. Many of these activities are taken from books widely available on the market today (Abruscato 1977, Allen 1981, Brown 1984, Gega 1977, McCormack 1981, Ontario Science Centre 1984). This Room of Exploration also includes Science Fair displays, inventions, or other products students produced during their preliminary activities. Signs, posters and decorations add to the atmosphere and reinforce important science concepts and vocabulary emphasized in their clubs. Each group of students spends at least one period during the day in this room. This tends to be one of the most popular events of the day.

Professional Development

Continued commitment to the ongoing professional development of teachers is a high priority for the future of science education (NSTA 1982). The program described here serves as a vehicle for modeling to teachers how process-centered science can be integrated into the regular curriculum. Teachers can literally learn with their students.

Teachers can also support and assist each other in this process. When possible advance group training is carried out. For example, the entire staff can be trained in the use of Project WILD or similar programs. The long-term hope is that more consistent and confident science teaching will result. In addition, teachers benefit from the interaction with local science professionals. They are made aware of reliable resources for future use.

Summary

Current pressure on elementary teachers to improve test scores in reading and mathematics cannot be allowed to eclipse the need for reforms in science education. Our complex society with its complex problems demands that students have knowledge of the interaction between science, technology and society. Every effort must be made to provide students with concrete experiences related to the "real world" that will enable them to become scientifically literate.

In addition, it is imperative that school districts provide teachers with their own hands-on experience in integrating science education across the curriculum while strengthening their own science teaching skills.

Reforms should be collaborative efforts between teachers, students, parents, and community professionals. The interdisciplinary Science Festival described here provides concrete experiences for students and teachers while attempting to implement a collaborative approach. Future festivals will strive to continue improving and refining this model.

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Program Development Through the DACUM Process

Clint L. Shepard
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Gainesville, Florida

Abstract

Even the best program has a functional life. Occasionally a new approach or direction is needed. Specific goals and behavioral outcomes for new programs can be identified by employing the interactive DACUM process for program development.

Using Children's Trade Books for Environmental Education

Paul Spector and Frank Knight
American Nature Study Society
Cohoes, New York

Abstract

For 25 years, this organization has honored authors of outstanding children's science literature. For the Library of Congress' Year of the Young Reader program, bibliographies of these books are available for parents, teachers, and organizations.

Challenging and Engaging Students: The Potential of EE

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Buffalo, New York

Abstract

Recent research conducted by the author has revealed that high school students are both engaged and intellectually challenged by activities requiring them to discuss their ideas and values, particularly to take and defend a position on a real-world issue. Such activities are a central feature of EE. This presentation will discuss ways in which EE can help overcome the problems of boredom, apathy, and lack of mental challenge that typify many high school classrooms.

Storytelling Art in Environmental Education

Susan Strauss
Portland, Oregon

Abstract

Internationally known storyteller, Susan Strauss, demonstrates how this ancient art can be used in environmental education. Includes: using anecdotes, ecological scenarios, folktales and myths; finding and develop-

ing the power center of a story; how storytelling operates on multi-sensory levels and goes beyond "giving the facts;" and learning from the Native American tradition.

Animal Inn - There's Life in Dead Trees

Ed Styskel, USDA - FS
Terry Reed, USDI - BLM
Greg McClarren, USDA - FS

Abstract

Animal Inn is a new public education campaign to conserve, through value awareness, certain dead or dying trees for wildlife and fish habitat. National in scope, it collaboratively involves the USDA Forest Service, USDI Bureau of Land Management, other forest owners and managers, state wildlife and forestry agencies, conservation organizations, and the timber industry.

Check This Out: Classroom Kits

Debbie Tewell, Interpreter II
El Pase County Park Department
Bear Creek Nature Center
Colorado Springs, Colorado

Abstract

Increasing demands for environmental education programs led to the development of outreach kits at Bear Creek Nature Center. Teachers use the nature center's activity guide and hands-on materials in their classrooms for a week.

Bear Creek Nature Center reaches 12,000 school children in El Paso County (Colorado Springs, Colorado) each year with environmental education programs. Many of these contacts are made by naturalist docents who are trained to lead these on-site guided "tours." Others are handled by Interpretive Division staff. In the last 13 years the programs have become so popular with teachers in the county that Bear Creek Nature Center is not able to accommodate all the requests.

Wanting to give students exposure to the natural world and its many wonders is not always a priority with urban parents, so teachers who could not schedule their classes for naturalist-led nature center programs were frustrated about getting "the message" to their students. To fill this gap, the nature center staff developed Outreach Kits for use in the classroom. These kits are checked out to teachers for a five day period.

Each kit contains hands-on materials, a slide show, many books, and an evaluation form. Materials revolve around one chosen theme. The basis of the kits are Teacher Resource Manuals that contain lesson plans, background information, suggested activities, vocabulary lists, and concepts.

The idea is not new. The approach, however, is tailored to our desire to disseminate information to groups that cannot be accommodated for on-site programs, the teachers' needs for hands-on materials that are not readily available or take too much time/expense for the busy teacher to accumulate, and our wish to keep the name of the nature center in front of educators who cannot be scheduled to visit our center.

Kits are developed at a 2-grade range (i.e., preschool/kindergarten or 5th/6th grades) and each costs around $250.00, not including the staff time spent in compiling information and materials. The funding comes from a "support fund" through our Naturalist Docent Organization's Annual Bird Seed Sale. At the present, there are nine kits to be checked out: **Animal Homes and Signs, Birds, Insects and Spiders, Colorado Wildlife, Forest Ecosystems, Your Five Senses, Geology, Endangered Species, and Reptiles and Amphibians.** Two grade ranges on **Water Conservation** are in the development stage.

Teachers sign a simple contract and leave a $20 damage/loss deposit when they pick up the kits. They are encouraged to pick up the materials on Sundays so they have time to review all the materials before their week begins. Many teachers use the hands-on materials to set up learning centers in their classrooms and others devise a week's worth of lessons revolving around the theme of the kit. How the kit is used is up to the teachers and their particular teaching styles.

When the kits are returned, teachers are asked to comment, by filling out the enclosed evaluation form, on how the kit was used, and how it could be improved.

A sample contract and kit contents list follows:

Outreach Kit Contract

I agree to maintain reasonable care of the materials loaned to me in this Outreach Kit. I understand that normal wear and tear is expected and that any charges will be for loss or breakage. I agree to leave a $20 deposit with the El Paso County Park Department, returnable when the materials are returned in good order.

Signature

Materials List	Prices	In	Out
Teacher's Guide	$10.00		
Slide Show and Tray	75.00		
Skulls in Riker Mount (muskrat/raccoon)	35.00		
11 Plaster Casts of Tracks	1.00 ea		
12 Track Cards	2.00 ea		
Horns: Bighorn Core	15.00		
Pronghorn Skull w/Horns	20.00		
Pronghron Horn	15.00		
Antlers: Elk	10.00		
2 Mule Deer	5.00 ea		
Furs: Skunk	15.00		
Red Fox	45.00		
Pronghorn	10.00		
Beaver	25.00		
Elk Hoof	10.00		
Coyote Jaw	3.00		
Snake Skeleton	50.00		
Predator Card Game	7.95		
Posters: Fish	5.00		
Riparian Habitat	5.00		
Publications: Mammals—Golden Guide	2.95		
Reptiles and Amphibians—Golden Guide	2.95		
Field Guide To Animal Tracks	12.95		
NatureScope—Birds Mammals	5.50 ea		
16 Zoobooks	2.20 ea		
Audubon Mammal Flash Cards	10.00		

Check Out Date:
Return Date:
Kit Theme: Colorado Wildlife

Name_______________ School_______________ Address_______________

School Phone_______________ Home Phone_______________

Hunters on the Wing

Guy S. Warner
School Board of Pinellas County
Clearwater, Florida

Abstract

An introduction to using birds of prey in educational programs. The special adaptations and ecological role of raptors will be emphasized. Participants will have the opportunity to dissect owl pellets as a hands-on extension activity. Curricular materials and literature on how to become involved in similar programs will be available for all participants. Live birds of prey will be used in this presentation if available locally. If not, a videotape will be used in the presentation.

A Technique/Data Support Role Rather than Integrated: An Experiment in Formal-Non-Formal Environmental Education Programming

Dr. Millie Wintz
Pennypack Watershed Association
Huntingdon Valley, Pennsylvania

Abstract

The elements of "context," time, place and focus, are the same factors most often cited as the inhibitors of formal-non-formal environmental education integration. Re-examination of the problem led to a year-long experimental programmatic relationship.

American Environmentalism: Our Religious Heritage

Dr. Charles H. Yaple
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Cortland, New York

Abstract

A historical overview of American environmentalism focusing on the religious/spiritual motivation that inspired individuals such as Thoreau, Muir, Leopold, and others. The maturing environmental involvement of organized religion will also be addressed.

Critical and System Thinking, Problem Solving, and Decision Making in STES (Science-Technology-Environment-Society) Education

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Abstract

The crucial issue within the environmental education context is not how to educate about the environment, but rather how to translate the agreed upon. Attainable objectives into manageable and effective educational programs, courses and curricula for all within schools and universities at all levels.

The above will be discussed in terms of a comprehensive critical and system thinking - problem solving - decision making model, accompanied by a few illustrative case studies of such a translation from theory and research into actual already implemented (successfully) courses and teaching strategies.

It appears to be agreed upon that the "environment" — although it may mean different things to different individuals, groups and nations — constitutes a major issue of concern of our time. The combined destructive impacts of a poor majority struggling to stay alive and an influential minority consuming most of the world resources may undermine the very means by which all people can survive and flourish in the years to come. "Development," mainly technological development, is believed — almost unanimously — to be the key for improving the present situation worldwide. Furthermore, no matter at what stage of technological development a certain country or society is, the aspirations, expectations, and conflicts people have or confront, are of the same nature as those that dominate the highly sophisticated modern technological societies. Although variations in emphasis, orientation, priorities, and formulation in different societies and different cultural contexts are apparent, our environmental problem within the socio-techno-political context can be summarized as being: too high human **expectations** in a **finite** world of conflicting **interests** and **values**.

A crucial problem we are continuously coping with is: how to improve the quality of life in a world of every increasing technological development given the "finite" environment we live within. The difficulty is that not the environment **per se** is the crux of the matter in this respect, but rather the citizens in our societies and their basic aspirations as far as the latter's environmental impact is concerned.

It is clear, therefore, that environmental quality and environmental problems are relevant for every citizen in underdeveloped, developing, and highly-developed societies. Since every citizen in a democratic society should intelligently participate in the decision-making process concerning both his natural or man-made environments, environmental education (EE), should become an essential and vital complementary and compensatory component within formal educational frameworks at all levels (Zoller, 1986/87).

EE is relevant to the personal-, societal-, economic-, and political needs of modern technological society; it is a mechanism for the promotion of improved standards of living that are compatible with environmental, cultural, and social imperatives in accordance with the particular local conditions and the specific environments people live in.

Life (always within the environment) is in essence a continuous process of **decision-making** or selection from available or created options. The "decision act," i.e., a decision to do (or not to do) something concerning a situation or a problem one is confronted by, is an essential precondition for an **action** to be (or not to be) taken accordingly. The "decision act" (or the decision-making process as a component of human activity) makes sense if (and, probably, only if) the prospective decision-maker is actually confronted with either a **problem** (or problems) to be solved, or with multi-available options to choose from. In both cases a "problem-solving" situation is involved and some sort of criteria is, or should be applied. Therefore, **problem-solving** (and the capability of problem-solving in the real **world context**) is a major issue of concern of EE.

Both problem-solving (PS) and decision-making (DM) within the STES context (Zoller, 1989) should be based on **critical thinking** which is a reflective and reasonable thinking focused on deciding what to believe and do (Ennis, 1985). Thus defined, critical thinking is a practical activity concerned with making decisions. Within the STES context, critical thinking as such will make sense if it is applied with **system thinking** approach (Capra, 1982) and guided by personal value judgment system of scientifically, technologically, and environmentally (in short, STES-) - literate people.

All the above should be integrated into a comprehensive, multi-dimensional teaching/learning model/framework. Thus, contemporary and future EE teaching and curriculum development efforts, should be guided by the following paradigms of modern environmental education:

1) **Incompartmentalization** of knowledge; i.e., the holistic, inter-disciplinary (Disinger, 1982), integrative-cognitive and affective (Miller, 1982) approach.

2) **System approach** and system thinking in dealing with the environment (Keiny, 1989).

3) **Multiple causality and complexity**, that is the recognition that most (and probably all) environmental problems have multiple causes and complex resolutions.

4) **Ethnological approach** to environmental problems; i.e., accepting that there is always more than **one** correct solution to any real environmental problem.

5) **Valuation** — the personal value judgment is both a legitimate and vital component of any decision, behavior, and course of action concerning the environment.

6) **Dynamic process** of change regarding both the environment (and any related problem tackled) and the students (and professors/educators) involved in EE.

The superordinate goals of EE appear to be agreed upon (Hammerman and Voelker, 1987). The **compensatory** role of responsive EE is thus clear: EE should aim at education for **all** (not some), should include components of science, technology, environment, and society, and should lead toward **responsible active participation of the students (our future citizens) in the decision-making and political processes concerning societal, economic, technological, and environmental issues within our democratic society.** That is, technological (and social) development and growth — yes, but **not** at any cost and only in accordance with a value-based order of priorities. These aspects of STES education have been recently reformulated in terms of the students' "STES PS-DM" act capacity; that is:

1) Ability to look at a problem and its implications, and recognize it as a problem.

2) Understand the factual core of knowledge and concepts involved.

3) Appreciate the significance and meaning of various alternative possible resolutions.

4) Exercise the problem-solving (not the exercise-solving) act:

-- Recognize/select the relevant data of information.

-- Analyze it for its reasonableness, reliability, and validity.

-- Evaluate the dependability of resources used and their degree of bias.

-- Devise/plan appropriate procedures/strategies for further dealing with the problem(s).

5) Clarify value structures/positions and then apply value judgment (and be prepared to defend it).

6) Entertain the decision-making act:

-- Make rational choice between available alternatives, or generate new options.

-- Make a decision (or take a position).

7) Act accordingly to the decision made.

8) Take responsibility.

Within the STES education framework a special emphasis should be placed on "relating to," "deciding," and "doing" — by people (for people) — on top of just "knowing" (cognitive learning) which means:

a) the application of appropriate, innovative, and/or non-traditional specially designed teaching strategies (responsive to the above needs) within contemporary, traditional (science) teaching and future courses, and

b) the development and implementation within (science) education of interdisciplinary environmentally-oriented "science in the social context"-type curricula.

The crucial issue within the EE (or the STES education) context is not how to educate about the environment (or about the interactions between science and technology, the environment, and society), but rather how to translate the **agreed upon, attainable** objectives into manageable and effective teaching strategies, educational programs, courses, and curricula for **all** within schools and universities at all levels.

Detailed description and discussion of such EE and STES strategies, courses, and curricula which are based on our comprehensive critical and system thinking — problem solving — decision model are beyond the scope of this paper. A few selected examples and illustrative case studies which were creatively and successfully applied (in combinations complementing and reinforcing one another) will be briefly mentioned to demonstrate the translation from theory to actual educational practice.

1) The inclusion of selected aspects of the environment (and STES-oriented problems) which have a particular relevance and meaning to every student within the framework of contemporary on-going traditional (disciplinary) science courses. [Example: The course "Environmental Chemistry in the Modern Socio-technological Context (Zoller, 1988)].

2) The deliberate integration of both the cognitive and the affective domains in dealing with real ("relevant") interdisciplinary life problems and issues within the students' immediate environment. The fostering of the application of **value judgment**, constantly through active participation and involvement on the part of the students (i.e., projects, group work, independent study, simulations, field trips, and other built-in nontraditional elements). [Examples: The Module "Smoking and Cigarette Smoke" (Zoller, 1979); The IEEP Curriculum (Zoller, 1986/87)].

3) The development of original environmentally (and/or STES) oriented teaching modules by the students themselves and their actual implementation and evaluation by them within real teaching. [Example: The Module "Alcohol and Alcoholism" (Zoller, 1982)].

4) The extensive use of the open-ended, problem-solving approach; the fostering of "asking question" capability in devising classwork, homework, and examinations; the extensive use of various nontraditional open-ended and high level thinking-type examinations. [Examples: The Fostering of Question-Asking Capability (Zoller, 1987a); The Individualized Eclectic Examination (Zoller, 1989a)].

The development of intelligent decision-making-problem-solving citizens, capable of coping with real life problems in the sociological-technological-environmental-political context call for the implementation of appropriate STES strategies, programs, and courses. The implications of an educational shift in the direction represented by our comprehensive model are enormous and far-reaching, philosophically, orientationally, professionally, organizationally, budget-wise, and educationally-socially.

The benefits derived from the adaptation and implementation of our STES-oriented strategies and curricula are clear albeit being highly demanding in terms of time input on the teacher's part, teacher training programs, and budget. Apparently, there is no "free lunch" in teaching and education.

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